

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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Wide World Map

French DPers Escape Attack On Iraqi Reactor

By E. Drake Lundell Jr.
CW Staff

BAGHDAD, Iraq — Several French computer specialists narrowly escaped death last week when Israeli Air Force jets bombed an Iraqi nuclear reactor here.

The widely condemned attack, which caused damages estimated at \$25 million to \$30 million to the French-built nuclear complex outside the city, cost one French technician his life.

The French computer specialists had already left for the day when the strike occurred.

Although Israel claimed the attack had been timed for late Sunday to minimize casualties, French sources indicated that the technicians followed the Moslem workweek, with Friday off. Most of the 150 French technicians, including the computer specialists, had therefore been on duty shortly before the June 7 bombing.

French losses could have been high if the U.S.-made F-4 Phantom jets had struck earlier, according to the French sources.

All of the French technicians reportedly have been ordered home because of the raid.

Next Week: A New Section

A new editorial section on office automation will become part of *Computerworld* next week.

Appearing every other week, the section will keep readers up-to-date on new products, word processing, electronic mail and all the latest information on the constantly changing office environment.

Both failures and successes of MIS managers' implementation techniques will be explored, along with concerns about management problems, productivity goals and the "human engineering aspects" of office automation techniques.

IBM Agrees to Give PCM Users Licensed Software and Support

By Robert Batt

CW West Coast Bureau

PALO ALTO, Calif. — Users of IBM plug-compatible mainframes (PCM) last week gained access to IBM licensed software and support services because of an agreement reached between the Armonk giant and National Advanced Systems (NAS).

The agreement came after several years of often bitter argument between PCM vendors and IBM. It stipulates that IBM's System Installation Productivity Options (IPO) will be made available to all licensees of IBM programs irrespective of the installed processor.

In return for this agreement, NAS withdrew a complaint it had filed with the Commission of the European Communities of the European Economic Community (EEC) in Brussels against IBM relating to System IPOs.

An IBM spokesman said the new code of practice has been circulated to IBM's sales force around the world and will be effective with any future releases of the DOS/VSE System IPO/E, MVS/SP System IPO, DPPX

System IPO and VM System IPO/E. "All licensees of licensed programs supported by these System IPOs will be eligible to receive appropriate System IPOs and support regardless of the installed processor," the spokesman added.

This means that non-IBM users will now get software revisions and updates on the same basis as current IBM hardware users.

An IPO is a series of IBM-supplied tapes that initialize a processor according to generalized guidelines. A user sitting at a CRT terminal can answer menu-driven questions sup-

plied by the tapes to determine the parameters of his system.

IBM had denied System IPOs to users with non-IBM processors. This caused a furor among IBM competitors, which charged IBM with anti-competitive practices, and led to NAS filing its complaint with the EEC commission. The NAS complaint complemented a similar complaint on interfaces filed with the EEC by Memorex Corp. [CW, July 9, 1980, April 13].

"The advantage of the understanding we have reached with IBM is that

(Continued on Page 4)

Industry Spotlight

Users Fueling Demand for PCMs

By Robert Batt

CW West Coast Bureau

Faced with the need to increase productivity at a time when skilled programmers and systems analysts are in desperately short supply, users are becoming much more assertive in their demand for IBM-compatible equipment.

This is the major conclusion drawn from recent interviews with manufacturers of plug-compatible mainframes (PCM). Most believe the PCM industry is now well established.

Chaos marked the mainframe industry after the introduction of IBM's 4300 series two years ago, but

today the general feeling is that users have ended their period of uncertainty and are increasingly willing to strike out on their own. Citing the change in attitude that has taken place in recent months, Greg Kelsey, assistant treasurer of Amdahl Corp., said, "There is a real groundswell of recognition in the user and financial communities that there is no compelling reason to hang on solely to IBM. There is no doubt, for example, that the acceptability of Amdahl to decision makers is increasing."

This view of growing acceptability is shared by Floyd Kvamme, presi-

(Continued on Page 10)

DP Scam Nets Over \$4 Million; Six Indicted

By Lois Paul

CW Staff

DENVER — A federal grand jury here recently accused six Pueblo, Colo., men of defrauding more than 2,000 clients of more than \$4 million in a computer-based scheme that purported to match businesses for sale with potential buyers.

Interstate Business Marketing, Inc. and Huff & Sons, two Pueblo companies operated by the men since February 1972, claimed to have computerized lists of more than 5,000 qualified buyers interested in purchasing businesses, according to a report in the *Rocky Mountain News* here.

The men claimed to use a computer to match businesses for sale with potential purchasers who had met established financial qualifications and who expressed the desire to live in a specific area of the country.

Clients interested in selling businesses paid a fee to the companies. They reportedly were told that Interstate Business and Huff & Sons advertised worldwide, that businesses generally were sold within a year and that the matched buyers would be contacted through a nationwide Wats line.

(Continued on Page 6)



Wide World Photo

A Shared Plight

Hunger-striking Vietnam veterans in Los Angeles last week had something in common with another group of vets who are writing a special computer program in Rutland, Vt. — both groups are seeking money to combat the effects of Agent Orange. Story on Page 6.



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Fairchild, Digidyne Win Suit

DG Guilty of Antitrust Violations

SAN FRANCISCO — A federal grand jury here last week found Data General Corp. guilty of violating antitrust laws by tying sales of its hardware to software.

After two weeks of deliberation, the jury decided in favor of the plaintiffs, Fairchild Camera and Instrument Corp. and Digidyne Corp. The jury concluded that by refusing to sell its operating system software separately, DG had the economic power to hinder sales of minicomputers.

Both plaintiffs produced and tried to market DG Nova-compatible processors. They were among a total of seven companies that filed antitrust actions against DG, all of which settled except Fairchild and Digidyne.

The jury finding of economic liability on June 9 is the first phase of the trial process. Next, the court must decide the financial damages the plaintiffs suffered from DG's market conduct. Judge William H. Orrick must set a date for the damages trial, but that will probably take at least three weeks.

Damages Asked

Fairchild has asked for \$80 million to \$150 million in damages; Digidyne is seeking \$10 million to \$30 million.

DG has said it will appeal the finding, but the firm will probably not be able to file an appeal until all phases of the current trial are concluded.

At any rate, the issue probably will

not be decided for two to three years, because the docket for the 9th U.S. Circuit Court of Appeals here is reportedly very crowded.

The original antitrust suit was filed Oct. 13, 1978, and the trial began on March 23, 1981.

Corrections

The six-part series on "Information Engineering" that concludes in this week's In Depth section is an excerpt from a forthcoming book entitled *Principles of Information Engineering*, authored by Clive Finkelstein and James Martin. The series was adapted with permission and is copyrighted by Prentice-Hall, Inc., Englewood Cliffs, N.J. The book is slated for publication in 1982.

In the story entitled "Organizations Need Generalists: Consultant" [CW, June 8], consultant Paul Traux called the advent of megabyte-storing workstations a factor driving the need for an information resources management (IRM) approach to DP. He did not say "an IBM approach."

The Micos Office Management System software package developed by Mini-Computer Systems, Inc. was listed as being available at a "one-time lease fee of \$2,500" [CW, May 25]. Micos OMS costs \$2,500.

EDS Challenge to U.S.-Iran Pact Rejected by U.S. Supreme Court

WASHINGTON, D.C. — The U.S. Supreme Court last week refused to consider a petition from Electronic Data Systems Corp. (EDS) concerning monies owed to the company by Iran while the case is still pending in a lower court.

EDS is challenging the agreement that freed the 52 U.S. hostages and dismissed all American firms' claims against the Iranian government. EDS

had been awarded a \$19 million judgment against Iran last May.

EDS asked the high court to consider its challenge to the agreement as soon as possible, but the court's ruling last Monday means the firm will have to wait until the matter works its way through the federal appeals court. Only then will the Supreme Court decide whether to get involved.

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IBM, U.S. Discussing Settlement

NEW YORK — A procedure that could possibly lead to a settlement of the Justice Department's antitrust suit against IBM was discussed in a telephone conference call last week between the government, IBM and Presiding Judge David N. Edelstein.

According to a transcript of the conversation supplied by IBM, U.S. Assistant Attorney General William F. Baxter said he had met face-to-face and talked several times with IBM lead counsel Thomas Barr about the groundwork for a procedure to end the case.

"We are discussing a procedure that would enable us to at least cut down the scope of this case, we hope, even lead to a settlement of it," Baxter told Edelstein during the course of the conversation.

"We have not reached complete agreement on what that procedure should look like, although I don't think we're going to have a great deal of difficulty reaching agreement on a procedure."

At a June 10 hearing in Federal District Court here that was supposed to bring Baxter and IBM together [CW, June 8], Baxter sent his deputy Richard Favretto to ask for an adjournment in light of pressing meetings Baxter had in Washington. Edelstein scheduled another meeting for June 18.

IBM Gives Software to PCM Users

(Continued from Page 1)

customers who are looking to outside vendors to provide them with productivity aids for software can now operate their computers in a much more efficient way by having access to System IPOs," David Martin, NAS vice-president of marketing, said.

"For users to have to constantly upgrade the release level of their operating system, access methods and various software elements is complex, costly and time-consuming. By having access to System IPOs, users will benefit enormously because it will take less programmer time to install new software at the customer site. The programmer can spend less time on updating and more time on application software development," he added.

In addition, NAS, which with 700 systems around the world claims to have the largest installed base of any of the PCM vendors, says its users will now also be able to order periodic Program Update Tape files from IBM.

Although the agreement was reached between IBM and NAS, it will apply to all users of equipment from PCM vendors such as Amdahl Corp., Magnuson Computer Systems, Inc., Four-Phase Systems, Inc., Cambex Corp., IPL Systems, Inc. and Control Data Corp.

"The agreement we have reached with IBM means users will be given much more flexibility in tailoring equipment to their needs. It really

Complaint Filed in Europe

National Advanced Systems (NAS) filed its complaint in Europe against IBM as part of a concerted effort by IBM's competitors to stem what they charge are monopolistic practices there by IBM.

IBM's agreement last week to offer its licensed software and support services to users of plug-compatible mainframes means that objections raised by NAS in its complaint to the Commission of the European Communities of the European Economic Community (EEC) have now been rectified, NAS said. It therefore withdrew a complaint it had filed relating to IBM System Installation Productivity Options (IPO).

IBM, on the other hand, said it had not been notified that NAS had withdrawn its EEC action and, in any case, the decision to offer the software and support to non-IBM users had been made for sound commercial reasons.

"IBM informed the EEC commission in December of 1980 that we intended to change our practice with regard to System IPOs," an IBM spokesman in Armonk, N.Y., said last week. "Our decision recognizes the evolving use of IPOs as a key vehicle for installing licensed programs."

Despite IBM's concessions, the EEC commission filed a statement of objections to IBM practices.

does help to open up the market in a big way," Martin said.

NAS, which competes against IBM in medium- to high-range equipment such as the 370/158 and the 4341 and above, says the deal is a cross-licensing agreement since IBM will now also have access to NAS software support materials for internal company use and for its own customer base.

It has been estimated that about two-thirds of system software cur-

rently on the market is licensed, with public domain software making up less and less of the market.

Industry sources said this is not the first time that IBM has done an about-face under growing market pressures. For example, in the early 1970s, when the add-on memory business was growing, IBM said it would not maintain processors if certain configurations from outside vendors were added. IBM eventually agreed to maintain the equipment.

IBM Loses Latest Round In Symbolic Control Case

By Robert Batt

CW West Coast Bureau

SAN FRANCISCO — IBM has lost the latest round in its 10-year legal wrangle with Symbolic Control, Inc. over allegedly illegal software practices.

At a hearing before the Northern District Court of California, an IBM request for an earlier dismissal suit to be renewed was denied. At the same time a request from Symbolic Control to add a \$10 million amendment for punitive damage to its original suit was granted.

In addition, the court decided to proceed to a trial of the violation issues with Symbolic Control being granted access to more material from IBM relating to the case.

When the case first appeared before the Federal District Court here, the trial was bifurcated to allow two main issues to be tried separately.

Impact Issue

First, impact — injuries allegedly inflicted upon Symbolic Control by IBM's pricing practices. And secondly, violation — a reference to the alleged illegality of the practices themselves.

In its successful amendment to the original suit, Symbolic filed a further claim for \$10 million in punitive damages to be added to the \$63 million, automatically trebled to \$189 million, which it sought in the original case.

The suit for punitive damages relates to alleged interference by IBM with Symbolic Control's potential customers in an attempt to reap an

economic advantage.

Symbolic alleges that IBM used predatory pricing practices by giving away its software in a bid to promote hardware sales, thus gaining an unfair advantage over competitors who could not afford to do the same.

The case is significant because it is believed to be the only private software antitrust case against IBM. If IBM were to lose the case it could spawn many other software lawsuits against the corporation.

Software Myth

Arthur Pfeiffer, Symbolic Control's president said: "By proceeding to a trial on the violation issue, we have the opportunity for the first time to focus on what we consider is the myth of public domain software."

"The whole basis of our accusations against IBM is that it used free software to lock users into its hardware," he said.

As a result of IBM's alleged actions, Symbolic Control claims that it was driven out of business. When the case was first heard, a district court judge dismissed the case against IBM, but the plaintiff appealed and a federal appellate court reversed the decision.

The next twist to the saga is scheduled to take place on Aug. 4 when attorneys for both sides appear before the district court to lay out a schedule for the trial expected to commence in early 1982.

So far Symbolic Control says it has spend more than \$1 million in legal fees.

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State Report Charges

Utah Center Pours \$1.5 Million Down DP Drain

SALT LAKE CITY — Ravaged by a 36% employee turnover rate and seat-of-the-pants management, Utah's State Information Systems Center (SISC) poured over \$1.5 million down the DP drain with little to show for the effort.

Further, of four major systems development projects undertaken by SISC from 1976 to 1979, three failed, one miserably, according to a recently filed report of the Legislative Auditor General.

The Utah report is the fourth issued in recent months in different states blasting system development efforts. Charges of overspending and under-producing have been levelled at development efforts in Massachusetts [CW, April 6], Minnesota [CW, April 20] and South Carolina [CW, May 18].

User Agencies Criticized

However, the Utah audit report did not lay all or even most of the blame for the waste and failures on the state's DP shop.

Rather, the report strongly censured overzealous user agencies that, in their haste to get things done, ignored recommended development procedures and thus subverted systems planning.

"User management often criticizes the phased approach as too costly and time-consuming," the report charged. "They want to skip the study and planning phase and spend as little time as possible on the logical design. The user does not understand why the [DP] staff wants to spend time analyzing user needs and studying their existing information system."

L. Richard Raybould, manager of SICS, said the audit report "is working on things three to five years in the background."

He further charged the auditor general's office with some political shenanigans, saying, "In a political environment you do not stress anything positive; it's one party trying to make the other party look bad."

Costly Consequences

Political realities notwithstanding, the report clearly points out the costly consequences of systems development that proceeds with planners pulling in opposing directions.

The most notable system development failure came within the Department of Transportation, where more than \$1 million was spent in an at-

Court Clears Way For Ecom Start-Up

WASHINGTON, D.C. — The U.S. Postal Rate Commission exceeded its authority last year by insisting that the Post Office offer Electronic Computer-Originated Mail (Ecom) on an experimental rather than a permanent basis.

So said the U.S. Court of Appeals here recently in a decision that appears to clear away the last legal hurdle barring start-up of Ecom service early next year as planned.

The computer services industry has been in the forefront of the opposition.

tempt to develop a fiscal management system.

Begun in 1974, the project was intended in part to develop an interface between the state's central accounting system and the fiscal management system.

Eleven-Month Failure

Eleven months and \$250,000 later, this phase of project development was deemed a failure and a year of financial accounting information had to be reconstructed.

"The major mistake was to allow the project team to violate development procedures in an effort to meet [the transportation department's] de-

mands," the report concluded.

"This nonstandard approach resulted in initial estimates which were not reliable and increased costs due to multiple reprogramming efforts," it stated.

High Turnover

The audit found SISC efforts were hampered further by an average 36% annual turnover of DP employees between 1977 and 1980, nearly double the estimate of the national DP employee turnover rate for the same period.

Most who left were motivated by the higher pay scales offered in the private sector, the report found, al-

though nearly one-third who left said management could not provide effective leadership.

To stem the flow of state DP funds, the SISC has embarked on a vigorous employee training program and has begun running an externally developed project tracking system called SDM-70.

"With our training programs we have gotten that figure down to something in the 15 to 20% range now," Raybould maintained. "We are motivating them with more interesting and challenging projects and making it easier for new employees to learn with our new software."

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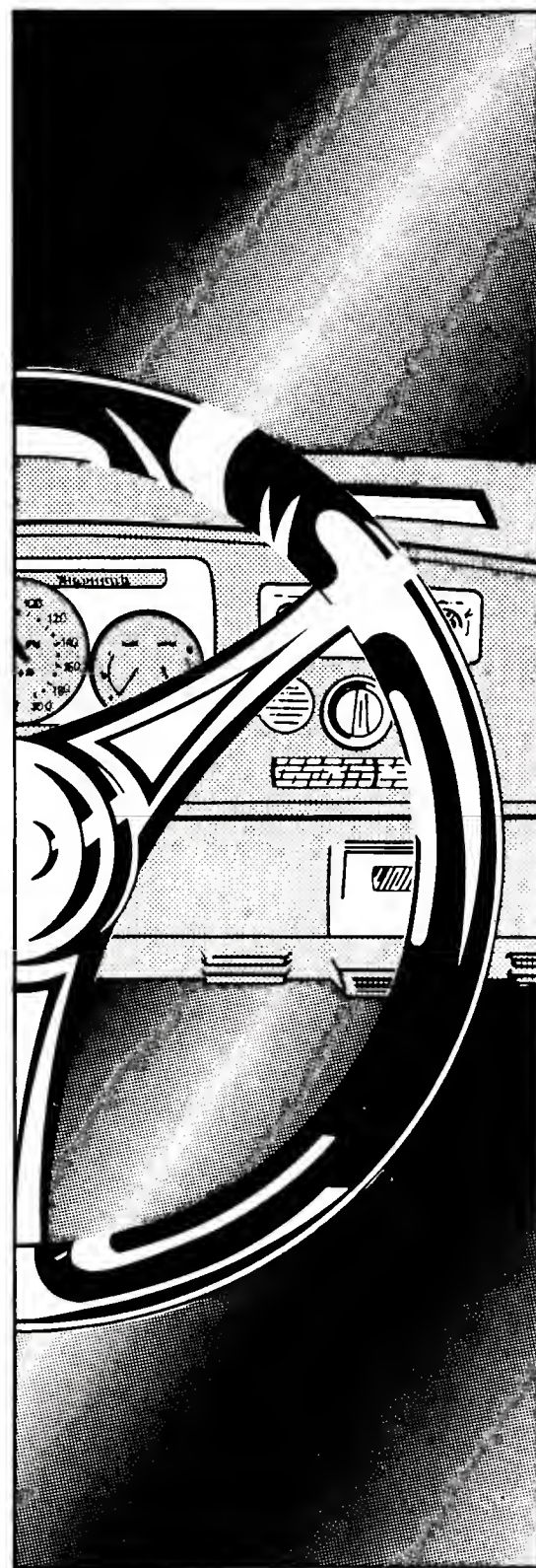
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But Face Cash Crisis

Vets Mobilize Micro to Attack Agent Orange

By Bruce Hoard
CW Staff

RUTLAND, Vt. — Vietnam War veterans here are computerizing military data to pinpoint pertinent facts about Agent Orange sprayings, but they are facing a cash crisis.

Ironically, the Viet vets are trying to undo damage that was originally perpetrated by other computers.

Agent Orange, a controversial herbicide, was used during the U.S. Army's "Operation Ranch Hand" between 1965 and 1971 to defoliate wide areas of Vietnam. Thousands of Vietnam vets who were exposed to the toxic poisons of agents Orange, White and Blue are now worrying about what, if any, harmful effects they may have suffered.

"The majority of each spraying mission was done by computer," explained Clark Howland, a disabled 30-year-old Army vet who is a member of the Rutland Chapter of Vietnam Veterans of America. "You entered the coordinates into the computer and it would be activated, apparently by windspeed, for the drop."

Howland is writing a computer program based on the Army's declassified "herb tapes." Those printouts detail the coordinates, amounts, areas, mission numbers and dates of sprayings. However, there is one problem.

"Right now, we can tell if you're directly exposed," he said. "But the tapes themselves are missing for 14% of the missions. Through the use of a computer and probability, we could narrow that down to 4% or 5% and that computer will help us make those calculations."

The next problem for Howland and his colleagues at the Rutland chapter is to get their hands on "that computer." The lack of it has plagued them since they started developing the program last winter.

At that time, Howland and other concerned vets, such as then chapter president Donald Bodette, were working with an underpowered Radio Shack TRS-80 Model I microcomputer. They graduated to a Harris Corp. minicomputer at nearby Castleton State College, but were forced off it by the prohibitive cost of computer time. Now they are back on another underpowered microcomputer, this one an Apple Computer, Inc. Apple II.

Studies of Maps, Tapes

What Howland has been able to do so far is study the herb tapes, along with a coordinate map of Vietnam, and correlate the two with the Apple.

Currently, the program can only scan the tapes. Howland hopes to expand it to enlarge the "coordinate squares" on a Vietnam map.

The projected program will also be expanded to cover the width of spraying patterns, the amount of drift and spreading by drainage. "All we need is a computer — and I'll donate my time to fully develop it," Howland vowed.

Vietnam Marine veteran Bodette described the "free-spraying areas" the Army inundated with the deadly chemicals and listed some graphic examples of contamination obtained from a General Accounting Office report, No. FPCD-80-23, issued Nov. 16, 1979.

In a free-spraying area "you could spray anything you wanted anytime you wanted," he explained.

On May 25, 1968, the Third Regiment of the Second Marine Battalion was sprayed by Agent Orange within two-tenths of a kilometer; three weeks later, the same men were sprayed within seven-tenths of a kilometer. On Dec. 28, 1967, the Third Regiment of the Second Marine Battalion was sprayed directly, Bodette

declared.

The U.S. Government has moved slowly in aiding the vets in their work, he commented. Eight months after he had initially asked for a map from the Department of Defense, Bodette finally turned to Sen. Patrick Leahy (D-Vt.), whose office procured the map.

Although Howland hopes to be able to offer some service to vets by the end of this month, the lack of money is holding things up. The chapter has sent off a grant request to the Disabled Veterans of America in Cincinnati, but its disposition is still in doubt.

Therefore, veterans who want to find out whether they were in an area contaminated by Agent Orange

will have to come up with between \$13 and \$25 to avail themselves of the service.

The Rutland veterans' immediate goal is to raise about \$9,000 to purchase a TRS-80 Model III, a printer and other supplies. Their ultimate goal is to distribute the program nationwide on a diskette. They would also like to set up a phone service, but lack of money also makes that problematical.

Howland, who has concluded he was exposed to Agent Orange, has but one intent: "All I want to do is get the word out." He said anyone interested in helping him do that can contact him at the Vietnam Veterans of America, Chapter 1, 1 Rice Ave., Rutland, Vt. 05701.

FCC Calls Justice Inconsistent Over Interpretation of Decree

NEWARK, N.J. — The Federal Communications Commission (FCC) cited the Justice Department for inconsistency early this month as the argument over interpretation of AT&T's 1956 Consent Decree continued here before U.S. Federal District Court Judge Vincent P. Biunno.

The key question is whether the "enhanced services" defined in the commission's Computer Inquiry II decision can be marketed by AT&T through a fully separated subsidiary without violating the decree.

According to the Justice Department and the many computer industry participants, the FCC's decision would let the phone company offer computer-based information services on a nontariffed basis despite the decree's requirement that virtually all AT&T offerings must be regulated and limited to communications.

Services "incidental to" communications, however, are explicitly per-

mitted by the decree. The FCC, in its recent court brief, said that because terminal equipment and on-line information services "are incidental to AT&T's basic service," the phone company can offer them on a nontariffed basis, particularly since these offerings "depend upon and presuppose use of the [regulated] basic service network."

The commission added that it has long had the "substantial and essentially final role in implementation of the [consent] decree in regulatory contexts," and has had the Justice Department's "apparent blessing."

Six Men Indicted In Fraud Scheme

(Continued from Page 1)

Only one business out of more than 2,000 attempts was sold through the computerized system, the indictment stated. The service's advertising actually consisted of ads in *Superman Comics*, *Teen Love*, *Teen World* and the overseas edition of *The Wall Street Journal*, the *Rocky Mountain News* reported.

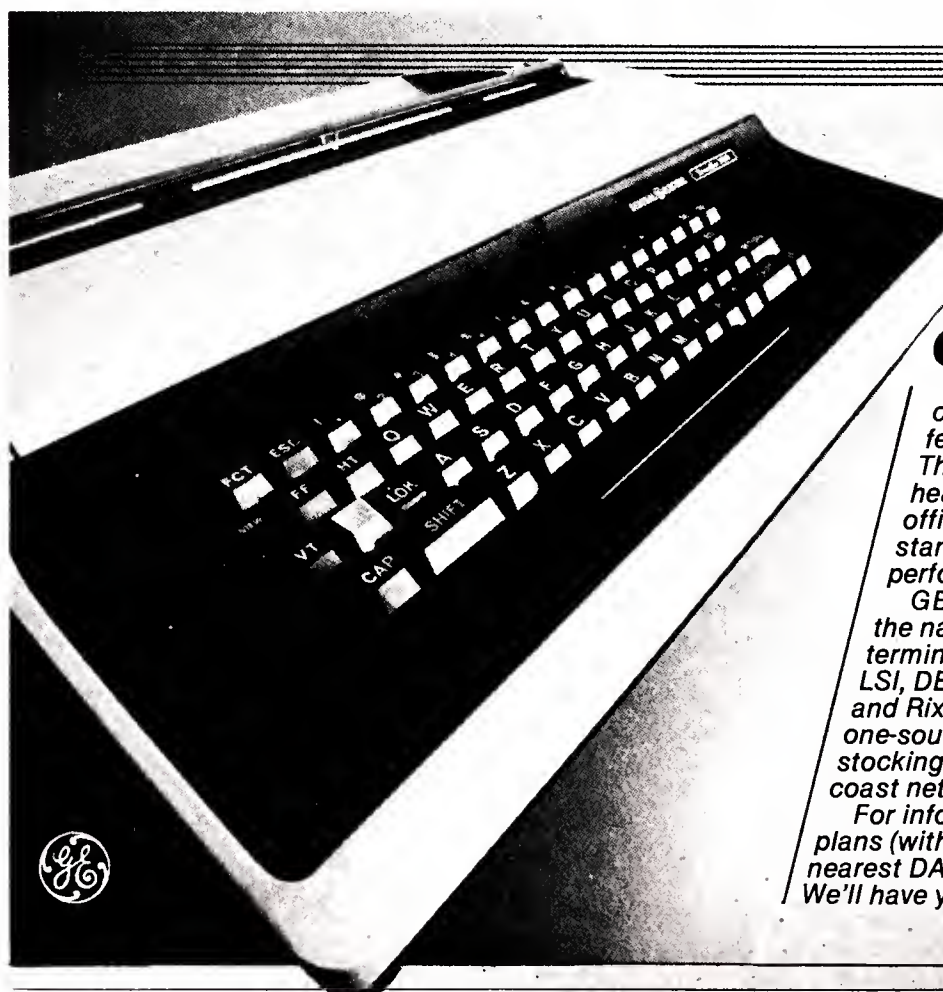
Leland Max Huff, John C. Huff, Rick A. Huff, John M. Huff, James F. Nierstheimer and James F. Gowell were named in the indictment and charged with mail fraud, according to a representative of the U.S. Attorney's Office here. In addition, Leland Huff and John C. Huff were charged with evading taxes for part of the 1970s, she added.

The indictment stated that instead of buying ads in national and international publications, Leland Huff, president of International Business, used the money to buy an airplane and a Rolls Royce.

The *Rocky Mountain News* noted that in their role as salesmen, John C. Huff, Nierstheimer and Gowell received 40% commissions on client fees paid to the companies. Rick and John M. Huff served as vice-presidents of International Business.

Robert McAllister, the U.S. attorney on the case, was unavailable for comment when contacted at his office here.

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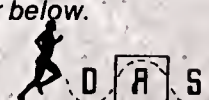


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New Print Mechanism Promises Lower Cost

By Marcia Blumenthal
CW Staff

NEW YORK — Users in the market for high-speed nonimpact printers can look forward to hefty price cuts in such systems next year, thanks to a printing mechanism using ion deposition technology introduced here last week by Delphax Systems.

Delphax, which claims the unit is the first ion deposition printing mechanism commercially available for integration into nonimpact printing systems, said models incorporating the new technology may cost half as much as those currently available.

The Delphax 2460 Image Output Module is the maiden product introduced by the newly formed, Canadian-based firm. The company has \$15 million in backing from Dennison Manufacturing Co. and the Canadian Development Corp.

Although the firm is selling the mechanism on an OEM basis to manufacturers, the company expects those equipment makers to incorporate the unit into the printing systems that compete with IBM's 6670 and Xerox Corp.'s 5700, both of which sell in the \$75,000 range, not-

ed Gary Ampulski, president and chief executive officer.

Besides reducing the initial cost of this type of printer, ion deposition technology would allow users to operate these systems at one-fourth the price of existing systems, Ampulski said. The firm estimated the eventual user cost of ownership at about 1.5 cents per page, based on monthly print volumes of 100,000 pages or more.

The 2460 will print at 60 page/min compared with a rated throughput of 43 page/min, but an actual throughput of 30 page/min, for the Xerox 5700, Ampulski maintained.

Ion deposition technology was developed during the past seven years by Dennison, which provided pat-

ents to Delphax. Current systems offered by Xerox and IBM are based on alaser xerographic process, which Delphax executives claimed is highly complicated, expensive and unreliable technology. Moreover, Ampulski said current nonimpact printers are redesigned copiers whereas the Delphax unit was built from scratch.

Quantity Price

Delphax is selling the print mechanism for \$8,000 in OEM quantities of 500 or more. The device will accept plain paper and will print 60 page/min of high-quality 240 pixel/in. images on 8.5- by 11-in. paper, accepting a raster scan from the manufacturer's formatter.

Manufacturers will add the formatter, paper handlers, interfaces and packaging to the print device. Even with these add-ons, manufacturers should be able to offer users high-speed nonimpact printers at half the price of currently available models, the firm claimed.

In addition, manufacturers can interface the mechanism to "anything electronic," which would allow the device to be used for other applications, such as facsimile, Delphax said.

Units will go out to beta test sights in September and will be ready for volume shipments by the first quarter of next year.

Delphax is located at 977 Pantera Drive, Mississauga, Ontario, Canada.

WU Accused Of Overcharge

WASHINGTON, D.C. — Western Union (WU), by intentionally deceiving the Federal Communications Commission (FCC), has been able to overcharge U.S. international record carriers (IRC) and their customers more than \$2 million, ITT World Communications Inc. implied in a recent complaint to the FCC.

The complaint is the latest development in a three-year-old investigation of the telegraph company's Telex/TWX rates. ITT went to the FCC shortly after Western Union admitted, in effect, that it costs substantially less to provide domestic Telex/TWX interconnections to the IRCs than to provide similar circuits to the general public.

The IRCs have been contending as much for some time, but Western Union has "repeatedly and vigorously denied knowledge of any meaningful cost difference," as ITT put it. The telegraph company's position changed recently when it discovered an in-house study showing that the costs of serving the IRCs are substantially less than the costs of serving the public. The study was done in 1977.

"Whether Western Union withheld this information by negligence, inadvertence, or conscious design has not been determined," ITT said. This company is particularly unhappy because in 1979, Western Union was allowed to increase its Telex/TWX charges to the IRCs.

The increase would have been denied by the FCC if Western Union had disclosed the cost-of-service study at that time, ITT contends. It has asked the commission to rescind the higher rates authorized in 1979 and order Western Union to pay back the excess charges collected since then. ITT said its overpayment to Western Union totals \$2 million.

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Advice of Chinese DPer Here to Study DBMS? 'Buy American,' They Say

By Lois Paul
CW Staff

RESTON, Va. — Two DP professionals from the People's Republic of China who visited here to study data base management systems (DBMS) are returning home with a recommendation to buy American products.

Chen Shengfan and Liu Luonan of the China State Administration of Computer Industry came to the U.S. in January at the invitation of John Maguire, president of Software AG of North America. Maguire had extended the invitation during the 1980 Chinese Trade Mission.

The Chinese professionals spent two months at Software AG offices studying its Adabas DBMS and, for three months since then, have been conducting research and experimenting with U.S. software products.

"Data base is a popular concept in China, but it is not well implemented," Chen said, adding, "The Chinese people need to use a data base system such as [Informatics, Inc.'s] IMS, Adabas or [Intel Corp.'s] System 2000."

He said the Chinese currently do not have the ability to create a DBMS, but will be able to use a data base system to do other work, such as

designing application systems.

Chen explained that his interest was not only to learn how DBMS works, but also to study the architecture of these systems.

Although it is important for some of the Chinese technicians to understand the architecture of a DBMS, Chen stressed that it is not necessary to design one themselves because they can buy one.

"If I create a DBMS myself, it may take five to 10 years," Chen said. "If we buy it, we save time and manpower and can improve our data processing."

A graduate of the mathematics department of Fudan University of Shanghai, Chen has worked on mathematical logic research at the Institute of Mathematics Research of the China Academy of Science. He also was involved in translating a Cobol compiler.

Liu graduated from the department of mathematics and dynamics of Beijing University and worked in the Electronic Technology Research Academy of the Fourth Ministry of Machine Building.

Both Liu and Chen will recommend that their government purchase U.S. DBMS products when they return, but both said it is "the leader," whom Chen described as "your



CW Photo by L. Paul

Chen Shengfan (left) and Liu Luonan logged many hours at the terminal working with U.S. software products during their five-month stay.

equivalent of the boss," who will make the final decision. Chen added, "The leader knows hardware, but does not know software or understand it very much."

He said recent university graduates in computer programs in China are emerging with a stronger understanding of software, which will be a positive force for the country.

Liu suggested that within the next few years, as more students emerge from Chinese universities with programming backgrounds, increased cooperation between the U.S. and China will be beneficial.

He said it would help for Chinese junior programmers to work with

U.S. senior programmers either in the U.S. or in China to learn as much as possible.

This type of exchange will not be easy, both agreed, but it will be the best way for Chinese programmers to gain experience they can bring back with them to improve DP in their own country.

Talks With Japanese

Chen said that Japanese DP enterprises are anxious to cooperate with China. Last month negotiations began between his own company and some Japanese firms. "We also would like to cooperate with the U.S. because the technicians here are the best," he added.

China should purchase IBM hardware, Chen said, "because the majority of users in the world use IBM and there are a lot of application programs available that would be portable on this system. We would not have to duplicate work."

"I do not mean that the architecture of IBM is better," he emphasized. The next move, according to Chen, should be to acquire an Adabas system.

"Adabas is suitable to the Chinese people," Chen said, "because of its ease of use. The Chinese do not have a lot of experience with data base." He said that in two or three months, they could use Adabas.

Chen is familiar with Cincom Systems, Inc.'s Total DBMS and Sperry Univac's DMS-90 and said both are more complicated.

The main computer Chen uses in China is the DGS 100 series, which is produced there and which, he said, is comparable to Data General Corp.'s Nova minicomputer system.

Chen also has used Siemens Corp.'s 77 series and CII Honeywell Bull's Level 6 equipment.

He programs in International Standard Organization Cobol, which he said is not much different from Ansi standard Cobol. He said the language is not very popular in China.

Chen is familiar with IBM's Assembler language, which he described as "very complicated" and "not a very good language, but a lot of people use the machines it runs on."

He also programs in Macro Assembler, but finds it difficult. Liu's primary language is Algol.

DP education has not been popular in the past in China and is just beginning to grow, Liu said. Fortran and Algol are popular, as is BCY, a Chinese language similar to Algol.

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Service Bureau Fined \$25,000 for Performance

By Bill Laberis
CW Staff

BATON ROUGE, La. — State officials here have slapped a \$25,000 fine on a service bureau for what one hospital administrator called "remarkably horrible performance" in processing Medicaid claims.

Moreover, the state's Department of Health and Human Resources is threatening to fine The Computer Company (TCC) again if its track record of late processing, and in some cases no processing, of claims continues.

The Richmond, Va.-based TCC won the contract to process state Medicaid claims last January. TCC underbid Ross Perot's EDS Federal Corp., which had held the contract for three years.

EDS then filed suit seeking to enjoin the state from awarding TCC the contract. EDS charged that TCC did not have the resources to handle the job of processing eight million Medicaid claims a year worth \$450 million.

A TCC spokesman said the company is presently processing Medicaid claims in nine other states, including two in which it acts as a subcontractor for EDS Federal.

The spokesman added that TCC has never been fined before, but declined comment on any questions related to the situation here, citing "contractual obligations with the state."

Meanwhile, a group of pharmacists here has reportedly filed a separate suit against TCC, alleging extraordinary claims processing delays that violate the service bureau's contract with the state.

"The [\$25,000] fine will just be deducted from our payments to them [TCC]," George A. Fischer, secretary of the Department of Health and Human Resources, said. "And they're going to right what's wrong or they're going to be fined again."

Bell Gets OK For EIS Tryout

By Phil Hirsch

CW Washington Bureau

AUSTIN, Texas — AT&T's on-again, off-again trial of a videotex-based Electronic Information Service (EIS) is on again, apparently.

The state court of civil appeals here told Bell last week that it can go ahead despite objections from Texas newspaper publishers and others, including Datapoint Corp. Earlier, as a result of these objections, the state public utilities commission (PUC) had enjoined Bell from proceeding with the trial.

Although the injunction is now lifted, the telephone company has not yet decided whether to revive EIS immediately, according to a spokesman.

One reason is a state Public Utilities Commission (PUC) hearing July 6. The appeals court in last week's ruling said the final decision on whether to let EIS proceed depends on the outcome of that proceeding. The telephone company, according to the spokesman, may wait until then before reactivating EIS.

Fischer said state law mandated the Medicaid contract be rebid every three years, and the state must accept the bid of the "lowest responsible bidder."

Spokesmen for six major Louisiana hospitals all confirmed the relatively poor performance of TCC in processing the claims, and none felt the service was getting any better.

Among the most frequent complaints was TCC's alleged practice of sending lump sum payments to appease the hospitals without ever sending any patient information along with the payments.

EDS was accused of the same undocumented lump sum practice recently in handling Blue Cross processing in Texas [CW, Feb.23]. There

EDS has been trying to clean up a backlog of thousands of unpaid claims since setting up a computerized processing system in 1979.

All the hospitals contacted in Louisiana complained of extreme delays in processing the claims. They further protested what several termed a blatant lack of cooperation and communication from TCC in trying to resolve the problems.

"I personally worked with a group of doctors whose accounts receivables doubled from January to May, due almost entirely to the Medicaid backlog," Rod Baker, acting comptroller at New Orleans General Hospital, said. "The service we've gotten from them is as poor as it could be."

Baker recalled that EDS had its

problems when it first took over the processing from Blue Cross in 1977, but that the problems were worked out in time and "things went along fairly smoothly."

A spokesman for Baptist Hospital in New Orleans complained that the hospital now holds more than \$400,000 in Medicaid accounts long past due, adding that the hospital has received "no cooperation from The Computer Company in settling the claims."

"They've been grossly untimely in their processing," Vicki Romero of Women's Hospital said here. "We've been able to get some money out of them since the first of the year. But we have had to beg for every cent they gave."

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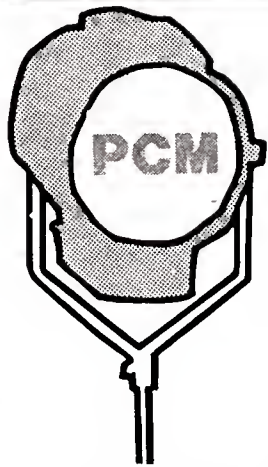
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"IT PAYS TO HAVE THE RIGHT CONNECTIONS"



Users Pushing Hard for More PCM Gear

(From Page 1)
dent of National Advanced Systems (NAS), the unit of National Semiconductor Corp. that took over

computer base. The NAS president agreed that the user is not looking to IBM for everything and is willing to make independent decisions.

"The introduction of competition into the IBM arena has come to be accepted by the users as healthy. The users want the PCMs to succeed badly because they perceive there is a need for us," Kvamme said.

It was this growing assertiveness on

the part of users that led another PCM, Four Phase, Inc., to make its recent bid for Two Pi Corp. Lee Boysel, the company's president, said the decision to acquire Two Pi was dictated by users' insistence that equipment should be IBM software-compatible.

"After the announcements of the 4300 and 8100, customers wanted to go with IBM-compatible code because they did not want to rewrite software. Frankly, we were stunned. Within 18 months IBM had moved its customers to a point where they demanded compatibility and as a result we had to come up with an IBM product ahead of schedule," Boysel said.

Because Four Phase estimated it would take \$15 million and three

years to develop a competitor in IBM's 4300 range, it decided that the only feasible alternative was to acquire Two Pi, which had a low-end

Industry Spotlight

unit compatible with the 4331-2. The acquisition was completed in February.

Boysel argued that the mainframe market will be dominated by the need for IBM software compatibility because of the shortage of skilled personnel and the emphasis on productivity. Driven to increase produc-

tivity, the DP manager is willing to pay a tremendous premium for IBM software compatibility, which takes precedence over speed, he maintained.

The perception of this market trend has led to some interesting strategy decisions by the PCMs. Magnuson Computer Systems, Inc., for example, aims to grow by 30% to 50% per year by concentrating on software compatibility.

Joseph Hitt, the company president, claimed that user involvement in IBM software will amount to \$2 billion to \$4 billion over the next few years. "We have come to the conclusion that with users feeling so strongly about the software base, you do not need to keep pace with IBM announcements. The key thing is to be compatible with the operating systems and the software base.

"The DP manager is looking for more applications to offset the effects of inflation on productivity, and our next step will be to package more systems solutions. We expect to make an announcement on this in the second half of the year," Hitt added.

The demand for software compatibility is being met in various ways by the PCMs. Magnuson's response to growing user demands is to offer a broader product base with more data base facilities, storage controllers and devices that can provide total hardware and systems software solutions.

Attack Through Breakup

Four Phase, on the other hand, plans to attack the IBM software-compatible market by breaking it up into segments. "We have an advantage over IBM in that we can segment the market and IBM can't," Boysel explained.

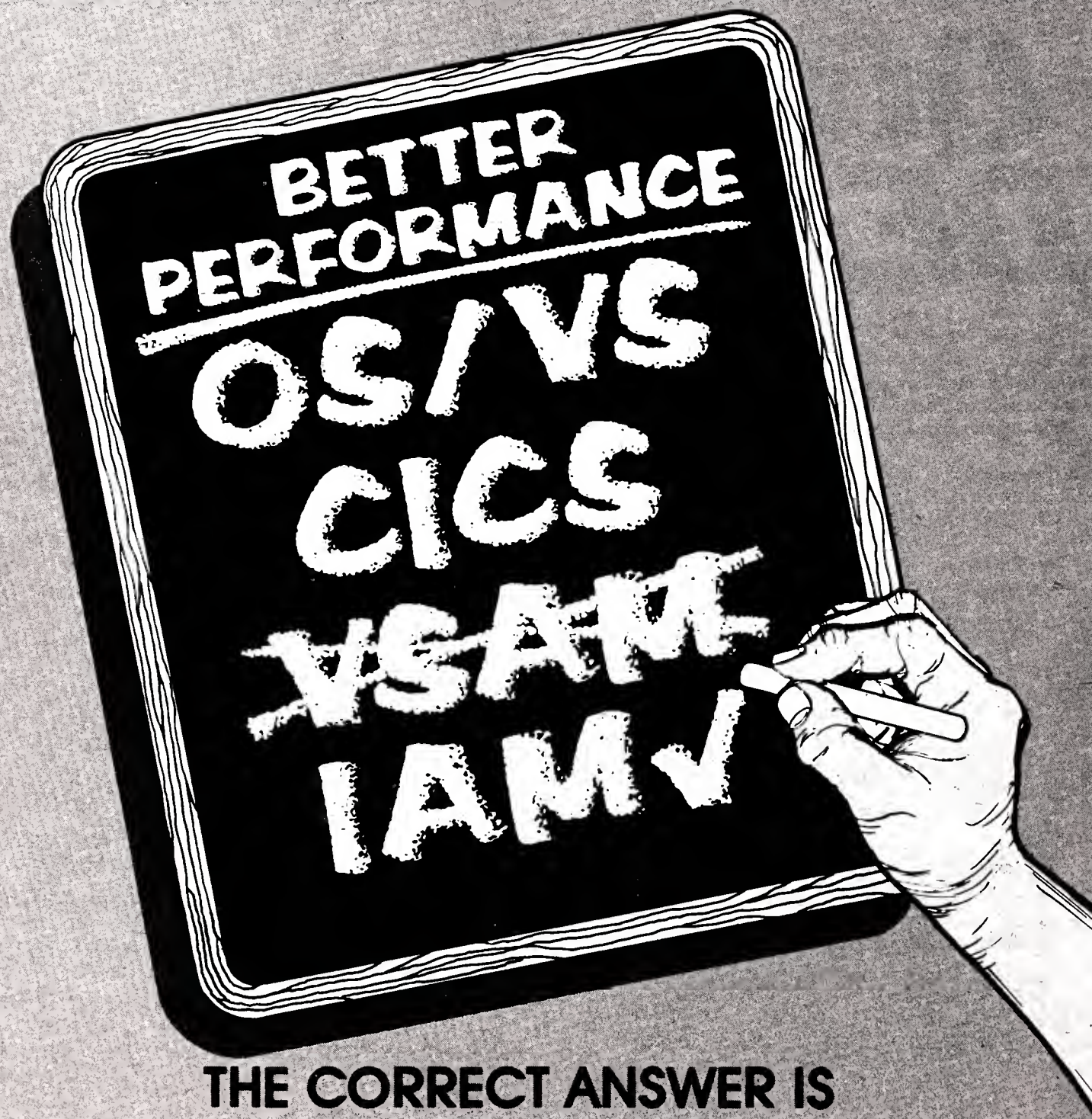
"When the standalone service bureau goes to IBM, [IBM] sells them a machine at the same price as it would General Motors with 50 such systems.

"We can segment the market by double-pricing in a way that IBM cannot. Our aim is to skim the cream of the Fortune 1,000 top companies by undercutting IBM's price. Customers which do not fall into that category we tell to go to IBM — that requires discipline on our part, but we feel it is the way to succeed. Our aim is to get so close to IBM that they cannot shoot us without shooting themselves in the foot."

Yet another approach to the same market is being advocated by NAS. Considering the chaotic situation it inherited from Itel, no one would have blamed NAS for following a cautious path, at least in the short term.

This is exactly what happened as the company attempted to consolidate the large customer base it had acquired and assure former users of service as usual. "There were 25,000 installed peripherals out there that we wanted to secure and our product line needed to ensure that the user base had a growth line," Kvamme said. "So far we have concentrated on the users of medium systems, but now we intend to focus more on competing in the large systems market occupied by IBM's 370/158 and 3031 users."

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SANTA CLARA, Calif. — If anyone needed to be convinced that the plug-compatible mainframe is a fixture on the computer scene, the career of Dr. Eugene M. Amdahl should dispose of any doubts.

Known as the architect of the IBM 360 series, Amdahl left the industry giant to compete against it. He founded and brought to fruition Amdahl Corp., now widely regarded as the No. 1 vendor of plug-compatible mainframes. Then he decided, once again, to start over.

Amdahl set up shop on the Great America Parkway here in Santa Clara last August and started Trilogy Systems Corp. (initially known as Acsys). Although it is years away from its first shipment — scheduled for the second half of 1984 — Trilogy is already being taken seriously, largely because of the reputations enjoyed by Amdahl and his son Carl (co-founder of another

PCM vendor, Magnuson Computer Systems, Inc.), who have come together to form the new enterprise.

"Both Carl and Gene consider that their life reputations are on the line," Tom Lerone, Trilogy's financial controller, said in a recent interview. "They consider themselves to have a major personal commitment to have this be a big success."

Trilogy plans to introduce a system that it claims will represent a significant breakthrough and a different approach to the technology of very large-scale integration (VLSI). "Although the product will be based on VLSI technology, it offers a different approach at the design level than that so far tried," Lerone said. "It is semiconductor-based and aims to simplify things by eliminating some components or parts."

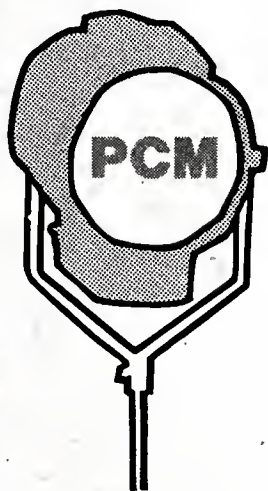
The system will be aimed at the large end of the commercial market and possibly extend into the low end of the scientific market, so there is no doubt Trilogy plans to be a direct competitor of Amdahl Corp. Over time Trilogy intends to go down market and offer a broader system range.

Better Climate

The climate of the industry is undoubtedly more conducive to forming a plug-compatible enterprise than it was at the beginning of the 1970s, when most pundits thought Gene Amdahl would come unstuck as he strove to challenge the dominance of IBM in large mainframes. Now, as Lerone pointed out, both Gene and Carl Amdahl have successful companies behind them, which will be a great help in attracting the \$100 million to \$120 million financing the company needs to carry out its research and development (R&D) work.

Trilogy's first priority is raising equity financing to cover the costs of production and services start-up. To this end, the company has been in contact with a number of California-based venture capitalists.

Moreover, in an attempt to reduce costs as much as possible, Trilogy has been negotiating with the Irish Development Authority with a view toward setting up a manufacturing plant in Ireland, where lucrative tax advantages are to be gained. If the plan goes through, Trilogy would make its own semiconductor devices in the U.S. and ship them to Ireland, (Continued on Page 12)



A key plank in the corporate strategies of plug-compatible manufacturers (PCM) is their contention that IBM is locked into its own technology.

IBM spends \$1 billion a year on research and development in fields currently occupied by PCMs. Beginning with the IBM 370, each of its last four generations of computers has been compatible with its immediate predecessor, so it is clear that IBM is constrained by its own user base and cannot afford to come up with any radical new technology that would upset that base, the PCMs argue.

Users know this and because they, too, are keen to protect the heavy investment they have made, IBM software compatibility is a must, the PCMs say. In this sense, IBM itself could be considered to be the leading PCM vendor.

"What we are intending to say with our product announcements is that IBM is totally predictable because the user base it serves dictates that they be so," Floyd Kvamme, president of National Advanced Systems, said in a recent interview. "IBM does not have such a lock-and-key control of the market that it can afford to go off in a totally different direction."

In other words, the job of the smaller PCM vendors is to analyze IBM product announcements, ensure there is nothing new in terms of compatibility and be ready with their own riposte. As Joseph Hitt, president of Magnuson Computer Systems, Inc., put it: "You need to make sure that your price and performance curve is correct and just keep going with your strategy."

The introduction of IBM's 4300 series in early 1979 signalled a new market aggression on the part of the Armonk giant. The 4300's price/performance ratio threw down the gauntlet to the major PCMs, sparking

Amdahl Corp.

By Robert Batt

CW West Coast Bureau

SUNNYVALE, Calif. — Although the switch from purchase to leasing brought about by IBM's 4300 series severely impacted Amdahl Corp.'s finances, its executives are distinctly upbeat these days about the company's future performance.

With revenues for the last year standing at \$394 million and earnings at \$15.22 million, the company is now firmly established as the No. 1 challenger to IBM at the top end of the market. In its recent first quarter, earnings rose to \$5.721 million compared with \$758,000 in the equivalent period last year.

It is the knowledge of what it takes to build up a successful enterprise that has enabled Amdahl Corp. to be fairly affable about losing its founder, Dr. Eugene M. Amdahl, to Trilogy System Corp., a new manufacturer of plug-compatible mainframes.

"We must view this new company as a potential competitor, but it will have to spend a lot of money on building up an organization. This will take four to five years, and we believe we can outengineer anyone — including Gene Amdahl," Jack Lewis, president of Amdahl, said.

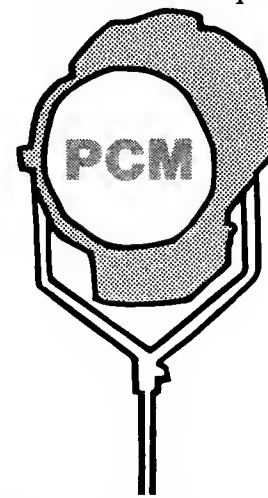
Cash Needed

Amdahl Corp.'s strategy is to build the highest processor that is compatible with users' software. That requires a lot of cash; Amdahl is currently spending 16% of its revenues on research and development, with one-quarter of that devoted to software.

This makes it vital that Amdahl keep a firm grip on its purchase-to-leasing ratio, currently standing at 70:30 after dipping to 60:40 at the height of market uncertainty last year. Gregory Kelsey, Amdahl's assistant treasurer, claimed that a major evaluation period by users has just ended and the air is clearer than at any time since March 1977, when the company made new product announcements.

"Users perceive that we are going (Continued on Page 12)

IBM?



complaints that IBM has indulged in overly robust tactics.

"Any DP manager who recommends a plug-compatible box can expect the IBM salesman to go above him and tell his superiors that he is a complete idiot," one high-ranking PCM executive told *Computerworld*.

Jack Lewis, president of Amdahl Corp., concurred. "IBM puts the fear of God into users, but slowly these users are recognizing that it is in their own best interests to have viable alternatives. It simply doesn't make sense to run a multibillion-dollar company using a single source for computers."

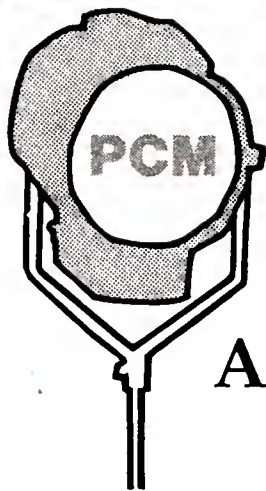
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Amdahl

(Continued from Page 11)

to be able to keep on top of IBM product announcements," Kelsey said. "In the medium-size systems, the market will become more of a commodity marketplace at the top end, and we are committed to concentrating our attention in that area while keeping our base at the high end."

Kelsey attributed the currently strong demand for Amdahl's 470V/8 machines, which compete directly against IBM's 3033, with a requirement by users for 30% to 50% more power every year as they strive to increase productivity. In Europe, the company's most popular product is the 470V/7B.

"We find that user sophistication depends to a great extent on geography. For example, in the banking sector, the U.S. is not so advanced as areas like Europe and Canada. On the other hand, in the U.S. in particular, oil companies and car manufacturers are showing increasing interest," Kelsey observed.

Losses of \$200 Million

The enormous expense required to bring a competitive product to market is exemplified by the fact that it was not until the fourth quarter of

1980 that Amdahl was able to show a profit in its service operations. For the first 10 years of its existence, the company was forced to absorb losses amounting to more than \$200 million in the support services area in order to achieve a viable market position.

Other reasons for Amdahl's bullish outlook include the company's perception of prospects for its own equipment and its anticipation of IBM announcements. Amdahl's 580 series of single and dual processors, in particular, is proving highly popular in competition with the 3031, according to the company.

In addition, the company plans to begin shipping its recently announced 380 series in April 1982; with demand reputed to be strong, Kelsey asserted that there is no doubt production would run at full capacity through 1983.

Amdahl claims it has nothing to fear from IBM in the way of new product announcements ("IBM will come up with some more machines, but we have not played all our cards either," Lewis said) and does not believe the new IBM 3081 poses a significant threat to its niche of the market.

"I do not believe that IBM is going to put out big numbers of 3081s given the debugging process they have to go through," Kelsey forecast.

Indeed, Amdahl is now so confident of its position vis-a-vis IBM that it is increasingly turning its attention to non-IBM users. Kelsey explained why: "With all the activity now going on in the plug-compatible field, it is the Sperry Univacs, Burroughs and Honeywells of this world that are in trouble. There is going to come a point where users of these manufacturers will have to bite the bullet and switch to the IBM plug-compatible field."

Amdahl believes that the amount of research and development now concentrated in the IBM-compatible field makes the present position of non-IBM compatible manufacturers untenable.

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Trilogy

(Continued from Page 11)

where the rest of the production facilities would be based.

Trilogy is also looking at building a chip plant in Ireland, but one constraint could be the shortage of skilled labor.

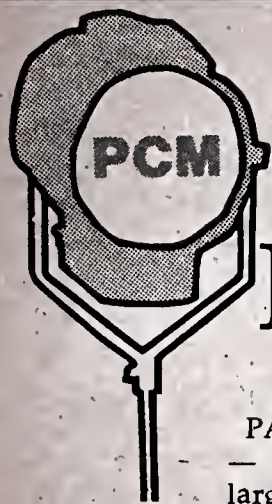
In addition, the company is considering entering into R&D partnerships with wealthy individuals in an attempt to cut down on development costs (Storage Technology Corp. recently raised \$50 million through an R&D partnership).

Under one scheme, investors would contract with the company in its R&D work, then take significant tax advantages and royalties from profits made.

But whatever approach Trilogy takes toward financing, one of its first tasks must be to recruit systems and design engineers. These it hopes to get from Silicon Valley. So far no technical staff have moved with Gene Amdahl away from his former company.

Wherever they come from, about 250 engineers will be required by Trilogy within the next 18 months, one-third of whom would be employed in designing and building semiconductor devices. Chips are clearly going to play a strategic role in the new company's thinking.

"Volume is the key. The plan is to get a quick start on volume production, and we want to persuade some prestigious users to take some of the early machines," Lerone said. "We are going to be investing a lot of time in marketing, and we want to be able to start shipments worldwide almost simultaneously in 1984."



NAS

PALO ALTO, Calif.

— Having gained a large user base in October 1979 after Ite Corp.'s computer operations collapsed, National Advanced Systems (NAS) faced a difficult task.

The company, a wholly owned subsidiary of National Semiconductor Corp., embarked on a Customer Satisfaction Program designed to ensure that no users were hurt by the move from Ite. Today, that user base's compatibility with IBM software remains a keystone in the company's strategy, according to Floyd Kvamme, NAS president.

In building large-scale integration products, the company must have high-speed machines capable of performing at one million instructions per second and up, Kvamme said. "Our products will always be micro-code based," he added.

But, Kvamme warned, the competition will be tough. He predicts more alliances along the line of that arranged by NAS with Hitachi Ltd. in which the Japanese manufacturer supplies NAS with equipment on an OEM basis.

"IBM is spending \$1 billion a year on research and development in the [plug-compatible mainframe] field. Anyone who thinks they can match them alone must be crazy, and that is why you need alliances," he said.



Four-Phase Systems, Inc.

CUPERTINO, Calif. — Since its inception in 1969, Four-Phase Systems, Inc. has grown steadily to become an established part of the plug-compatible mainframe (PCM) arena. Its acceptance in this market was recently reinforced by its acquisition of Two Pi Corp.

Four-Phase's sales last year reached \$197 million; its leasing base is worth \$128 million. The company has concentrated its attention on distributed data processing (DDP), which, according to Lee Boysel, Four-Phase president, "is the [market] that is going to go crazy in the 1980s, reaching \$125 billion by the middle of the decade.

"Ten cents in every dollar is used to finance on-line terminals because of the movement of applications into remote areas where the cost of computing is cheaper than at the corporate centralized level," he added.

Four-Phase's aim is to integrate software solutions, hardware versa-

(Continued on Page 14)

Magnuson Systems Corp.

By Robert Batt

CW West Coast Bureau

SAN JOSE, Calif. — By stacking its products against IBM's trail-blazing 4300 series, Magnuson Computer Systems, Inc. has proven it can thrive where the competition is toughest.

Founded by Carl Amdahl, son of Gene, Magnuson has directed much of its marketing efforts at IBM 370/135, 138 and 148 users that were all set to switch to the 4300.

"Users are more confident of going away from IBM than they were five

years ago. Our architecture is designed so that we do not have to change it every time IBM makes additions to its CPU," Joseph Hitt, Magnuson president and chief executive officer, said.

The strategy appears to be on course. The company recovered from a loss of \$2.3 million in 1979 to record earnings of \$2.5 million in 1980 on revenues of \$27.8 million.

Much of Magnuson's financial prospects lie with its leasing arrangements to customers. The vendor sells

its leases to three outside leasing companies; residual values reflect changes in the market caused, for example, by depreciation.

Magnuson claims this arrangement has more flexibility than IBM's scheme, with its emphasis on fixed residual values.

According to Magnuson, users are beginning to appreciate the difference between the various concepts of residual value.



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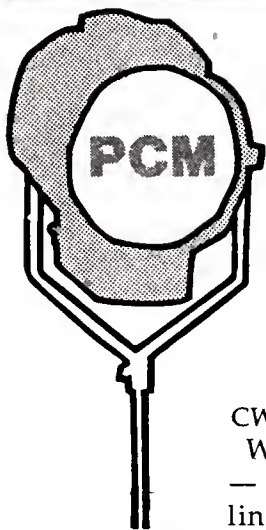
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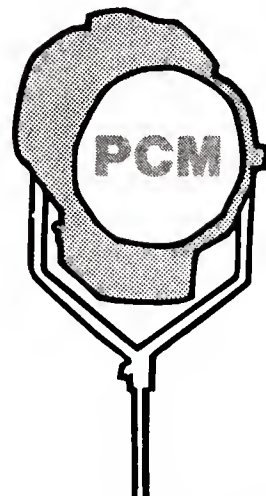

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Cambex Corp.

By Robert Batt
CW West Coast Bureau
WALTHAM, Mass.
— Cambex Corp.'s
line of plug-compati-



Four-Phase

(Continued from Page 13)

ility and field support into a single cohesive package. Like the other major PCMs, it has concentrated on compatibility with IBM software through products such as its System 311 and 312, and the company plans to penetrate the DP, office systems and communications markets.

Since it first turned a profit in 1973, Four-Phase has been a fairly cash-rich company; it spent more than \$15 billion on research and development last year. It is committed to a lease base structure, soon likely to account for 50% of revenues. According to Four-Phase, this enables its customer base to grow more rapidly.

Much of Four-Phase's concentration has been in the medical field, which accounts for one-third of its business, and in the government sector, which accounts for one-sixth. Four-Phase attributes much of its success to the reliability of its systems, which are able to support the numbers of terminals needed in a big hospital system.

Automation Jewel

The company claims to be the biggest supplier of medical institutions in the U.S., having shipped 15,000 terminals to hospitals. "The automation of the medical industry is a jewel for us. It has got to be the growth market of the world," Boysel said.

Four-Phase also credits much of its current success to its nationwide maintenance network, which cost \$100 million and took five years to complete. The company believes it is vital in competing against IBM.

The strategy appears to be paying off, following a rough time for the company on the stock market as it absorbed costs in a bid to build up its user base. Boysel says business for the first quarter is better than at any time in the history of the company — earnings stand at \$1.769 million compared with \$1.127 million in last year's quarter.

"We took a lot of flack for a year or so, but we were willing to sacrifice earnings to incur the expense of staying in a growing marketplace," Boysel said. "We could have sold our lease base off, but we were not willing to do that for short-term gains."

ble mainframes. has steadily increased in importance to the point where it is now considered by executives to be the primary influence in the company's future.

Although the company, formerly known as Cambridge Memories, Inc., says it does not intend to compete head-on with IBM, it is looking to become more involved in "application and solution machines."

"We are looking at starting up joint ventures with other companies with a view to supplying solutions to par-

ticular problems, for example in the area of data bases," Jane Saniuk, product marketing manager, said.

Software AG Venture

One such venture was announced recently between Cambex and Software AG of North America, Inc., the Reston, Va.-based vendor of the Adabas data base management system for IBM 360 and 370 machines; a few similar joint ventures will be announced later in the year, according to Saniuk.

Cambex has made steady progress since 1975, when its preoccupation with the memory business led to financial collapse and the possibility that Cambridge Memories would have to file for bankruptcy.

Although last year Cambex brought in revenues of only \$4 million, results for the first half of 1981 have already reached that level, and the company expects to double its income this year.

Cambex places great emphasis on its microcode capability, which is commonly regarded as containing more flexibility in a fast-growing IBM marketplace than hard wiring. "The market is growing to a great degree because more and more users can afford to buy hardware. Because our machine is small and easy to package, we think we can take advantage of these developments," Saniuk said.



By Robert Batt
CW West Coast Bureau

WALTHAM, Mass. — The last eight months have been a major transition period for IPL Systems, Inc. here as the manufacturer moved from being principally an OEM vendor to becoming a vendor of end-user plug-compatible mainframes (PCM).

Founded in 1973 by Steve Ippolito, a former IBM manager, IPL announced in October last year that it would sell its products directly to the end user. It had been operating for several years as an OEM supplier for Olivetti Corp. and for Control Data Corp., to which it supplied CPUs for the plug-compatible Omega mainframes.

To finance the transition, IPL made its first public stock offering last month and raised \$12.1 million through the sale of five million shares.

"When IBM announced its 4300 series, it created a \$20 million market for mid-range plug-compatible suppliers. We sincerely believed IPL was one of the few companies that had a suitable product that could compete with IBM, and so we wanted to control our own destiny by going directly into the end-user market," Ron Bleakney, IPL's vice-president of sales, told *Computerworld*.

The company launched its end-user program last fall. It set up sales offices in all cities across the country and hired 18 specialist sales representatives personally recruited by Bleakney, himself a former vice-president of Documation, Inc.

Quick Deliveries

IPL plans to use its experience as a supplier of OEM equipment to penetrate the end-user market with quick delivery schedules. The company's product line, the 4400 series, has three machines — the 4436, which IPL claims is 50% faster than IBM's 4331; the 4443, an IBM 4341 rival that

runs at one million instructions per second (Mips); and the 4446, scheduled for September delivery and designed to compete against IBM's latest 4341 Group 2.

"We have a tremendous production capability brought about through our arrangements with Olivetti and CDC, and we expect to be able to deliver a replacement for a 4341 within 30 days. In all probability, we will be the first vendor to supply an IBM plug-compatible processor to compete with the 4341 Group 2," Bleakney said.

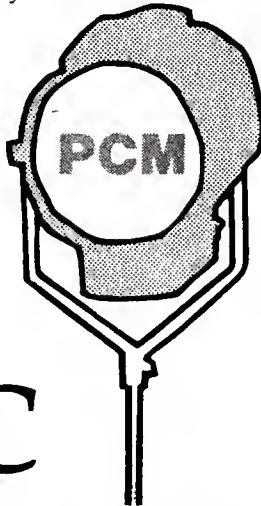
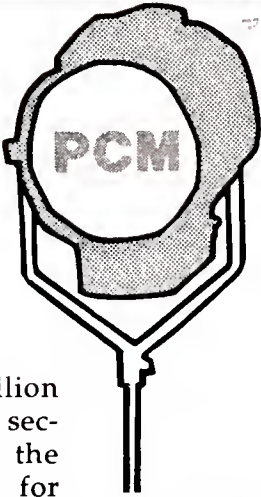
IBM is expected to deliver its 4341 upgrade next month; industry analysts say it will be a 1.44 Mips machine. IPL said its new machine would operate at 1.5 Mips.

To date, IPL has shipped more than 225 processors, mostly to Olivetti — which owns one-third of IPL — and CDC, which has retained the right to market IPL machines under its Omega label.

The company claims to have installed more than 20 CPUs in the last eight months in office bureaus, insurance companies and peripheral equipment manufacturers. While last year's earnings reached \$1.2 million on revenues of \$12.6 million, early 1981 results indicate an improvement. First quarter sales were \$3.5 million and earnings were \$370,000.

"We have an impeccable financial record and have used this to transform the company into an aggressive end-user manufacturer, backed up by a solid OEM arrangement with Olivetti for distributing our systems in Europe.

"Our niche is primarily in the mid-range processor market competing head on with IBM, Magnuson [Systems Corp.] and National Advanced Systems," Bleakney said.



CDC

MINNEAPOLIS — Although Control Data Corp. entered the plug-compatible mainframe (PCM) field with its Omega series, the company says its 480 machine does not represent a significant presence in the PCM marketplace and it has no plans to increase its influence in that field.

CDC gets the Omega processor from IPL Systems, Inc., then adds its own peripheral equipment and sells the system as a complete package.

Accordingly, the arrangement with IPL was seen as a marketing ploy by CDC to package its own tapes and drives, the major part of its business.

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DPers Resist Innovation, DP Director Charges

By Jeffry Beeler
CW West Coast Bureau
SAN FRANCISCO — "Computer people often aren't very innovative, even though their mission is to provide users with new and improved services," and they are hindering the business world's efforts to boost its information systems productivity, this city's DP director said last week.

Although innovation plays a key role in improving programmer productivity, most computing department heads have proved extremely reluctant to adopt state-of-the-art technological concepts or to experiment with new ways of doing their jobs, Henry Nanjo said during the Government Management Information Sciences annual conference. In-

stead, these managers "are constantly pounding their programmers and systems analysts to stay within [es-

CW
At GMIS

tablished technological] boundaries" and cling stubbornly to the "way things were done before."

Many computer-room chiefs, for example, refuse to consider alternatives to Cobol, are steadfastly committed to centralized processing, "close their eyes" to the possibility of giving their users personal microcomputers and hesitate to network their

stand-alone minicomputers, he explained in the conference's keynote address. The result is that programming and other facets of information systems productivity have failed to keep pace with rapidly escalating labor costs.

Another consequence, according to Nanjo, is that despite plummeting hardware prices, the cost of supplying computing services continues to rise.

To bolster sagging information systems productivity, some industry observers have urged U.S. computing departments to emulate Japanese management techniques, but Nanjo rejects that advice.

"Japanese management practices simply aren't applicable in this coun-

try," he said. "In my own computer department, for example, we tried to adopt a Japanese technique known as 'term management,' but the experiment ended in almost complete disaster."

Probably the only Japanese management trait that could be successfully transplanted to the U.S. is the Far Eastern country's characteristic concern for each individual employee. "If you show genuine concern for your employees and are willing to modify your management style sometimes," Nanjo told his listeners, "I think you'll experience an increase in your information systems productivity."

NTIA Nominee Calls Decontrol No. 1 Priority

CW Washington Bureau
WASHINGTON, D.C. — Bernard J. Wunder, President Reagan's nominee to be chief administration advisor on information and communications, told a Senate confirmation hearing last week he plans to make telecommunications deregulation his No. 1 priority.

If confirmed as head of the National Telecommunications and Information Administration (NTIA), Wunder promised the Senate Commerce, Science and Transportation Committee, he will work closely with the panel "to ensure that regulatory reform legislation in this area is promptly enacted."

The nomination for Wunder to be assistant Commerce secretary for communications and information appears headed for quick approval.

Responding to a question from committee chairman Bob Packwood (R-Ore.), Wunder said under his direction there will be "considerably more emphasis on international matters" at NTIA, particularly, he said, on transborder data flow issues.

Wunder said he intends NTIA to be the prime coordinator of international policy matters. That responsibility is now divided among several agencies.

He told committee member Howard Cannon (D-Nev.) he does not favor "any changes in the [policymaking] structure as it now exists" among those agencies, saying what is needed is "a much stronger coordination role between the responsible agencies."

Wunder said there will be "certain changes in NTIA's internal organization and priorities" to support its role in international issues.

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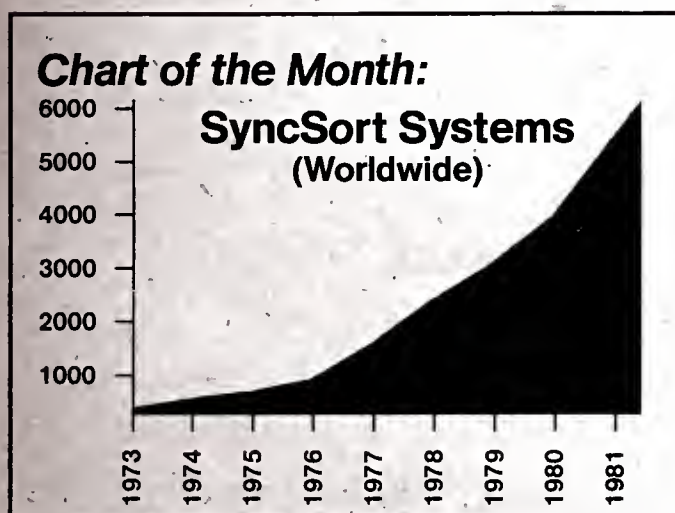
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And if you're not, well, it's time you gathered around our groaning sorting board and found out what really efficient sorting tastes like.

Clearinghouse Plan to Speed Health Claims

By Bill Laberis
CW Staff

NEW YORK — A computerized clearinghouse to speed the processing of millions of medical claims is under development here by a consortium of 11 large insurance companies.

Scheduled for a partial start-up in May 1982, the Health Claims Distribution System will attempt to forge an expansive data communi-

cations link between the insurers and hospitals and clinics that provide health care.

The system will help to establish industrywide standards for the electronic submission and processing of millions of medical claims that total billions of dollars per year, its founders anticipate.

Boeing Computer Services Co. will develop and operate the system for the National

Electronic Information Corp. (Neic), formed here in January by the 11 insurance companies. The companies account for more than 60% of the medical claims generated by the country's 1,200 private insurers.

"They'll be prepared to work with anywhere from 40 [million] to 60 million claims through 1985," said Robert S. Bradley, Neic president. "It [the system] represents a co-

operative effort that I think is unheard-of in American business."

Under the proposed system, hospitals will send batches of electronic claims information directly to Boeing's IBM installation in Vienna, Va.

"We hope eventually to receive all claims information either by high-speed lines or via direct dial-up on phone lines," he added. "The im-

portant thing is that we will receive the information in a standardized form that will permit us to do some front-end editing electronically to check for completeness and accuracy."

After performing the electronic edit checks, rejecting and returning incomplete claims, the system will sort and distribute the claims to the insurers, again over leased phone lines.

King conceded that developing the communications interface could be a tricky procedure, given the variety of host processors used by the providers and insurers.

"I know most of the bigger insurance companies use IBM processors in their data centers, just as Boeing does," he said. "I wouldn't say there aren't going to be some problems, particularly on the provider end. But nothing significant."

Based on Standards

King said the hospitals are already familiar with the data entry methods that Neic will require, because the proposed system is based on standards recommended by the federal government for Medicare program reimbursements.

Neic estimates a 30% claims processing savings with the proposed system over existing methods, savings that the corporation said will increase as other non-Neic insurers contract to use the system and claims volume increases. Last year, the private insurers paid out more than \$26 billion in claims.

Neic also estimates the system will knock four to six days off the claims processing time, resulting in an improved cash flow for health care providers.

Neic's 11 members include: Aetna Life and Casualty Co., Connecticut General Insurance Corp., Equitable Life Assurance Society of the United States, John Hancock Mutual Life Insurance Co., Lincoln National Corp., Metropolitan Tower Corp., New York Life Insurance Co., Pacific Mutual Life Insurance Co., Provident Life and Accident Insurance Co., Prudential Insurance Co. of America and Travelers Corp.

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Parker Eyes Paid Informers to Stem DP Crime

By Jake Kirchner

CW Washington Bureau

WASHINGTON, D.C. — Use of paid informants to combat computer crime is not a pleasant prospect, but it may become necessary as opportunities for large DP-related fraud increase over the coming years, Donn Parker told a security seminar here recently.

Parker, noted researcher and lecturer on the subject,

acknowledged computer security specialists "are horrified at the idea" of using informants to deter or catch computer criminals. However, he said, those specialists generally do not realize "the ugly, dirty nature of security."

"You are in a war [and] there is a real enemy," he told the seminar on federal information systems security, sponsored by the U.S. Department of Agriculture and

the Federal ADP Users Group.

'Powerful Tool'

Informants are "a very powerful security tool," he said, and they will have to be used, at least in certain specific circumstances.

In a wide-ranging discussion of the subject, Parker, senior management systems consultant for SRI International, said "nobody has the

slightest idea how much computer crime there is."

There is no real basis for the figures that are thrown around, he stated, suggesting it would be better if security experts simply stopped trying to estimate the extent of computer-related crime.

While professing not to know whether such crime is increasing or decreasing, Parker did note newspapers now rarely report any but

the most interesting cases.

Conjecturing on the future of computer security, Parker said it is instructive to look at security measures in the military — the source, he said, for most of the DP security measures now commonly used, such as cryptology, pass cards and personnel background investigations.

On the subject of background checks, Parker said "Security has basically to do with the trustworthiness of people." However, unlike the military, where people operate under strict, well-defined codes of conduct, private-sector security checks are limited by personal privacy considerations.

Question of Rights

Submitting to a background investigation "does require abrogating constitutional rights," Parker allowed, but he said loss of certain rights might be necessary for some high-level members of the DP profession.

At the very least, the profession requires "a far stronger concept of personal accountability." Referring to codes of ethics developed by the Association for Computing Machinery and the Data Processing Management Association, Parker said that "codes of conduct are essential to spell out what is authorized and what is unauthorized."

However, even with codes of conduct, until people really understand they are measured on computer security they will not follow the guidelines they should, he said.

As far as licensing computer professionals, he said, "I don't think that's very practical. It may be in another 10 years, but it certainly isn't today."

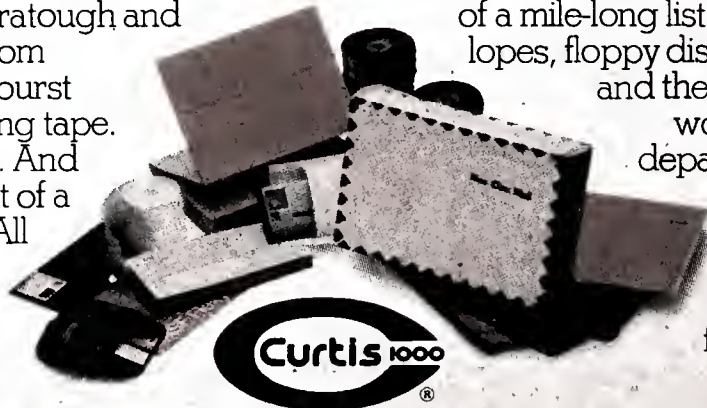
In general, the next 10 years in computer security will see reliance on "generally accepted practices and safeguards," similar to today's standard approach to industrial security.

In fact, he added, the DP industry has already reached that stage to some extent, with generally accepted practices ranging from locked doors to passwords for terminal log-on.

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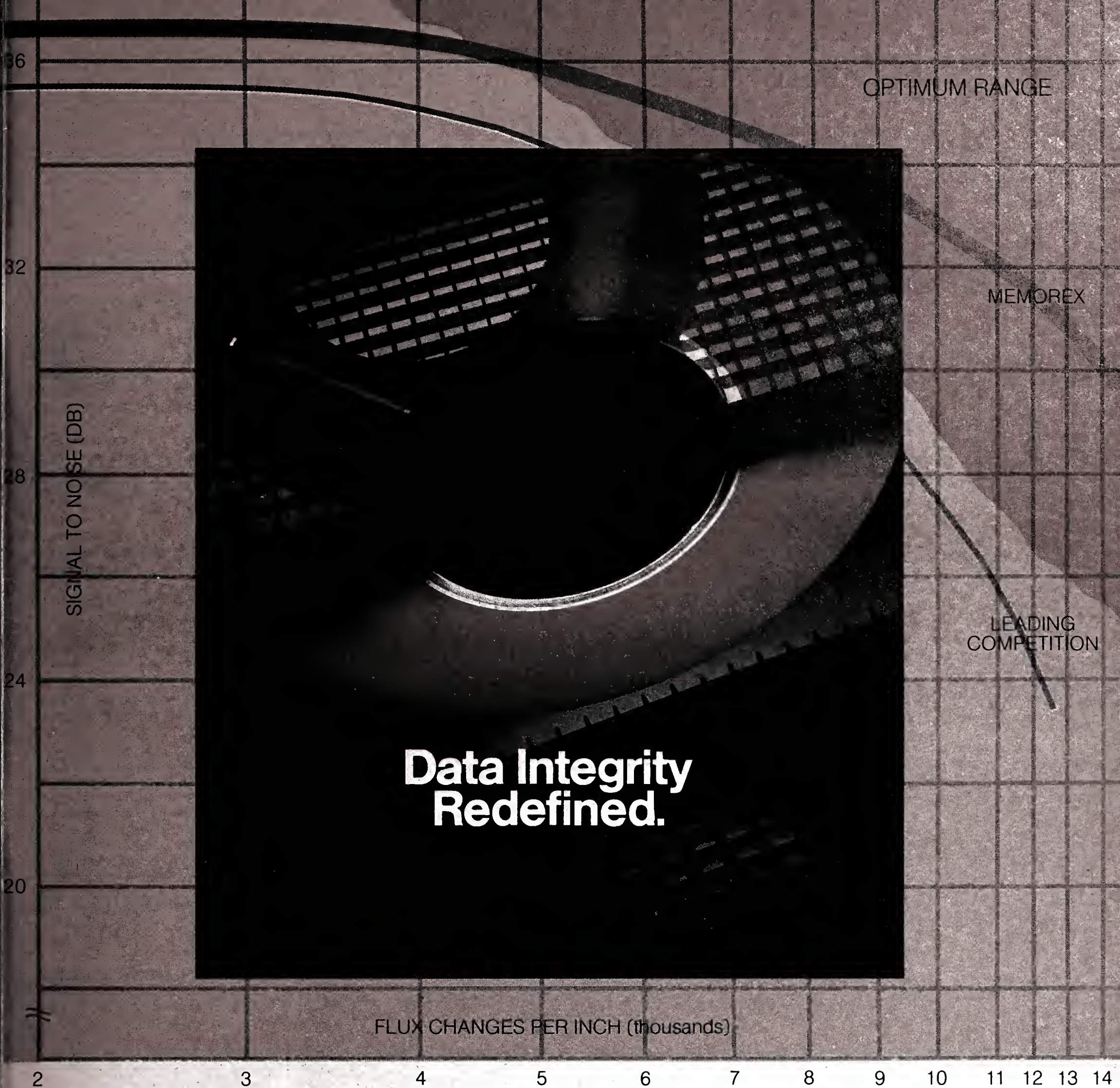
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Managers on the Move

NANCY E. COHEN has been appointed vice-president of management information systems at Hapag-Lloyd (America), Inc. in New York. She will be responsible for developing the second generation of automated systems for the company, its agents and its North American affiliates.

Cohen has an extensive background in data processing, having served with Barber Steamship Lines as director of management information systems and worked at a service bureau and IBM.

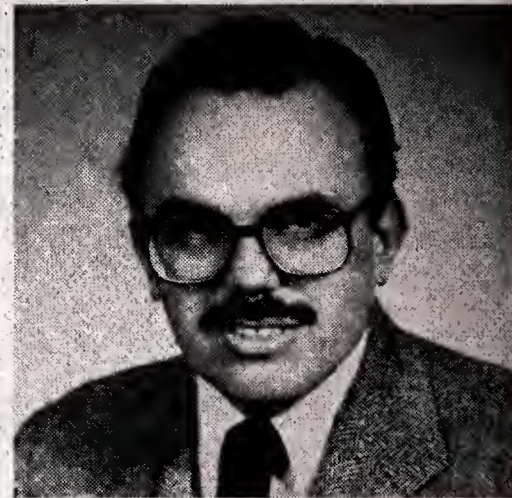
Cohen is a graduate of the Rhode Island School of Design.



Nancy E. Cohen



Frank J. Militello Jr.



Richard B. Root

DR. ANDREW A. BLANCHARD

has been promoted to director, management information systems at Banquet Foods Corp. He will now head

Banquet's 24-person management information systems (MIS) and computer operation in St. Louis.

Prior to joining Banquet in 1980, Blanchard worked on the operations research staff at McDonnell Aircraft Co.

Blanchard received his Ph.D. in mathematics from the University of North Carolina and earned his bachelor's degree, also in mathematics, at Georgia Institute of Technology. He was a Navy line officer and instructor at the Naval Academy and later a researcher at Johns Hopkins University in Baltimore.

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JOHN J. MARIANA has been appointed corporate vice-president of data processing for Anixter Bros., Inc. in Skokie, Ill.

During the past 10 months, Mariana has directed the moving of Anixter's computer operations from its original location on Fargo Ave. in Skokie to its corporate headquarters building on Golf Road in the same town.

Mariana, who joined Anixter in 1975, has a B.S. degree in mathematics from the University of Pittsburgh and an M.B.A. from Loyola University in Chicago.

FRANK J. MILITELLO JR. has been elected senior vice-president of computer systems for Associates Bancorp, Inc., South Bend, Ind., the subsidiary of Associates First Capital Corp. that provides computer services for Associates Corp. of North America.

Militello joined Associates Bancorp from Citibank in New York, where he was responsible for redesigning the bank's automated retail banking systems for electronic and paperless modes of customer service.

Militello is a graduate of Thornton Junior College in Harvey, Ill.

RICHARD B. ROOT has been elected vice-president of Central National Bank of Cleveland's Computer Services Division.

Root is manager of the data base and systems programming section. He joined Central in that capacity in 1980 and was elected assistant vice-president earlier this year.

Root received his B.A. degree in psychology and philosophy from the University of Akron and an M.B.A. from the University of Illinois. He also holds the professional Certificate in Data Processing.

WILLIAM T. CORUM III has been promoted to the newly created post

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William T. Corum III

of vice-president of data services and product development for the Health Services Division of McDonnell Douglas Automation Co. in St. Louis, Mo.

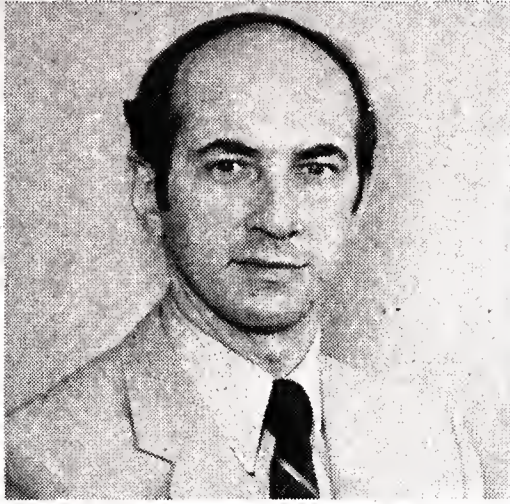
Corum began his career at McDonnell in 1957 as an engineering draftsman and advanced to deputy director of information processing in 1969. In 1971 he became manager of technical services and eventually was moved up to director of all data services.

Corum received his M.B.A. degree from California State College. He was a contributing author to the book, *Information Systems Handbook*, and has published numerous papers on data processing and related subjects.

...

H. JOSEPH HAREN, Data Processing Operations Department manager, has been elected a vice-president of the Broadview Savings and Loan Co. of Cleveland, Ohio.

Previously, Haren worked as tech-



H. Joseph Haren

nical services manager for Broadview, which he joined in 1974.

Haren studied at Ohio State Uni-

versity and at Kent State University.

...

THOMAS W. WESLEY JR. has been appointed director of management information systems at the Benson Co. in Nashville, Tenn.

Over the past 24 years, Wesley has been employed by IBM and worked in several of its corporate locations.

Wesley is a graduate of the University of Houston, with a B.S. degree in marketing. He is also a graduate of the IBM Systems Research Institute.

...

Carter Hawley Hale Stores, Inc., based in Los Angeles, has announced the appointments of WILLIAM F. JONES JR. to general manager of in-

formation systems and ROBERT M. MENAR to general manager of information services.

Jones joins the company having served most recently as vice-president of management information systems at the Hudson Division of Dayton-Hudson Corp.

Menar joined Carter Hawley in 1978 and most recently served as director of data services.

...

JON C. DELL'ANTONIA recently joined Seaboard Allied Milling Corp. of Shawnee Mission, Kan., as director of information services.

Prior to joining Seaboard, Dell'Antonia was director of information services for Harte-Hanks Communications, Inc. in San Antonio, Texas.

Bergquist Gets HP3000 Award

ARLINGTON, Va. — The Hewlett-Packard Co. 3000 International Users Group presented its 1980 award for Outstanding Contributor to its Contributed Software Library to Rick Bergquist, manager of software development at American Management Systems, Inc. (AMS).

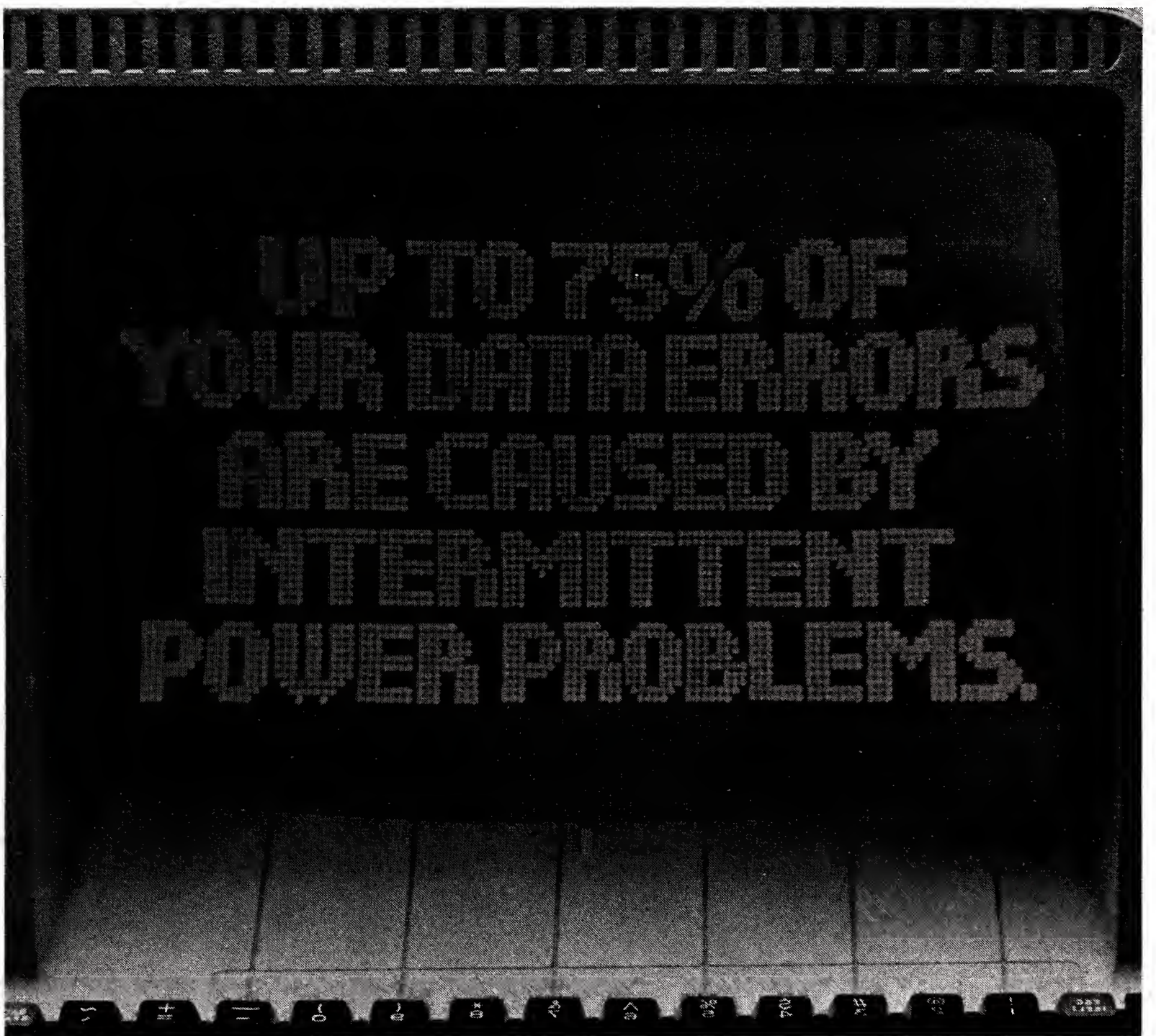
The award was presented recently at the group's international meeting in Orlando, Fla.

"Rick was selected as the individual who best reflects the HP 3000 International User's Group motto of 'Information Through Interface and Involvement,'" according to board member Wayne Holt. Holt is director of computer services at Washington State's Whitman College, which houses the group's \$3 million software library.

"The award recognizes not only his valuable software contributions, but also his overall service to the HP 3000 International Users Group," Holt said.

Bergquist was recognized for several software contributions, including DB Loading, a routine that produces statistics on data base usage and highlights potential performance problems.

DB Loading was developed as part of Bergquist's work on Environment/3000, an AMS software development product for the HP 3000 computer.



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Complex But Flexible

IBM Series/1 Test Snags Preclude Comparisons

By Hillel Segal
Special to CW

The IBM Series/1 is a powerful machine that can be utilized for a vast array of applications. The Series/1 operating system supports five programming languages as well as a number of utilities.

The hardware options are expansive and follow a modular design that allows for many specialized configurations. However, such flexibility carries with it a high degree of complexity — as we quickly discovered.

The Series/1 is the second computer in the \$25,000 to \$50,000 range that the Association of Computer Users has reported on for *Computerworld*. Unfortunately, our consultants ran into a number of problems in executing their speed tests on the Series/1.

The most serious snag occurred in precisely the test we are reporting here — a CPU-intensive program run simultaneously with an order entry program.

This setup resulted in an unexplained loss of characters in the order entry application.

Because these test programs ran properly on a number of other systems, it is unlikely that the bugs resided in the programs themselves. It was never decided, though, whether the problem was hardware- or software-oriented.

No Assistance

When consulted, IBM chose not to provide us with technical assistance to solve this problem. Consequently, we can make no direct comparisons with the times reported for other systems.

However, other test programs that did run on the Series/1 indicated that the system was reasonably fast, although not as swift as the Wang Laboratories, Inc. machine reported on previously.

The system our consultants tested cost \$52,375. This included a 4955E CPU, 160K bytes of central memory, a 64M-byte hard disk, a 4978 display terminal, a 4973 line printer and an I/O expansion unit with a four-line programmable communications card.

This system could be easily purchased for less than our \$50,000 limit by buying less main memory, a smaller disk drive or a less expensive printer.

Since 1969, IBM has sold its software separately. A standard software package for the Series/1 would cost an additional \$10,000, although most users choose to lease the system software for about \$175/mo.

Software Complexity

The Series/1 could best be described as a "minimainframe." Even though its architecture is new, its user interface is like a scaled-down version of an IBM mainframe. Programmers with previous experience on IBM systems should feel quite comfortable programming the Series/1.

Two operating systems are offered with the Series/1. One is a real-time programming system intended for the experienced IBM user. The other

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Series 3 Results

Test E-4

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TI DS990 Model 4	} To be covered in future issues	
Hewlett-Packard 250		
DEC Datasystem-255		
Alpha Micro AM-100T		

* Programs could not be run properly because of a loss of characters in the order entry processing.

is the Event-Driven Executive (EDX), which is designed for smaller applications and less experienced users. Both systems allow multiterminal, multitasking and multiprogramming applications.

ribly sophisticated system ... but it gets the job done."

Another user was more critical: "The Series/1 system software is two years behind the hardware." It is clearly a give-and-take situation. The

This is the 30th in a series of articles giving the highlights of benchmark tests conducted on popular, small computer systems. The full reports were originally published by the Association of Computer Users, a 4,000-member nonprofit organization.

In our tests we used EDX, as did most of the other Series/1 users we interviewed. EDX is modular, permitting a large variety of applications to be performed. It supports Fortran, Cobol, PL/I, EDL and macro assembler. Our tests were run on Cobol.

Language of Choice

From interviews with users, our consultants concluded that EDL is the "language of choice" because of its greater ability to capture the full flexibility of the Series/1. IBM's Cobol, on the other hand, was rated by users either "fair" or "poor."

EDX also offers a number of utilities, including interactive debugging, a full-screen editor and a data management facility for indexed file operations.

While this software versatility is enticing, it is not as easy to take advantage of as one might hope.

One problem is that the user is forced to explicitly determine a number of system variables that might better be controlled by the operating system itself — program priorities, file sizes and types and scheduling of peripheral devices.

In general, users were satisfied with EDX, although several commented on its lack of sophistication. As one user put it: "EDX is not a ter-

user gives up simplicity to gain greater flexibility.

Offers Versatility

As with the software, the Series/1 offers both versatility and complexity in the area of hardware options. IBM obviously had communications in mind when it designed the Series/1 system.

The 4955 CPU can have up to 256 individually addressed devices attached and has from 64K bytes to 256K bytes of main memory. The Series/1 also offers the 4952, which has from 32K bytes to 128K bytes of main memory.

In general, users were satisfied with the speed of the CPU, although some indicated a considerable slowdown during I/O handling. The only other complaint came from a few users that expressed the need for more main memory.

The Series/1 offers a wide range of storage devices, including disk, diskette and magnetic tape drives. With the 4963 disk subsystem, users can have as much as 258M bytes of storage capacity.

Most of the Series/1 users contacted were very pleased with their storage devices.

Four different display units are available, providing a variety of CRT screen sizes and keyboard configura-

tions. All of the terminals are "smart," being controlled by a microprocessor that plugs into the CPU I/O channel.

In their tests, our consultants used a 4978 display station. They were very impressed by features such as programmable function keys and separate numeric and cursor control pads.

Reports on the 4973 line printer were not nearly so favorable. Users complained of loading difficulties, too much noise and general dissatisfaction. One user commented: "The 4973 is difficult at best to load ... sometimes I'd just like to throw it out." The Series/1 offers two printers, but the 4973 is the top of the line.

IBM Name

"The good thing about the Series/1," remarked one user, "is it has the IBM name ... [and] lots of support behind it." This is particularly true for hardware services. Software support was rated as being somewhat spotty.

In general, our consultants and the Series/1 users we interviewed found the IBM sales and technical personnel to be both knowledgeable and helpful.

Documentation for the Series/1 consists of several hundred publications and is nearly as complex as the system itself.

Every question imaginable probably is covered somewhere in one of the manuals. Finding that one spot in the right publication, though, is no easy task.

Two Classes Satisfied

There were two classes of users that seemed most satisfied with the Series/1. One type consisted of users that purchased the Series/1 as a "turnkey" packaged system from a vendor. The other type was a relatively large firm with a competent staff of experienced IBM programmers.

The problems our own consultants encountered reinforces the belief that experienced IBM programmers are a necessity for enjoying the Series/1 to its maximum.

An overall appraisal of the Series/1 might best be expressed by the comment of one user: "The Series/1 is an honest piece of machinery. It does what they say it will, with a high degree of reliability ... [It is] a basic piece of machinery that you just can't fault."

As for the problems we encountered that prevented our consultants from completing the benchmark tests, this may or may not be indicative of IBM's commitment to support users.

We've given IBM a standing offer to rerun the tests if they would provide us with technical support.

Hillel Segal is president of the Association of Computer Users, a nonprofit association with members in the U.S., Canada and several other foreign countries. A package of information about the Association of Computer Users is available from the group at P.O. Box 9003, Boulder, Colo. 80301.

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CPAs' Program Tests Costs For Real Estate Options

By Deborah Wise
CW Staff

LOS ANGELES — A computer program that can forecast costs for real estate development projects under a variety of different conditions is being used by a CPA firm here to gauge the economic feasibility of its clients' plans.

"It was primarily developed in the early '70s for our use in the consulting business," said Traude Valachi, a manager in the management services department of Kenneth Leventhal & Co., a CPA firm with 14 offices nationwide and with 80% of its clients in real estate.

"The biggest feature is to let the cli-

ent test out the what-ifs of his assumptions," she added.

A client, for example, can ask the computer what will happen if he builds now at today's costs or in two years; or what are the savings if he builds eight or 10 units. "One of the most asked question nowadays is what happens if the interest rates change on the construction loan," Valachi said.

Testing Options

Leventhal & Co. uses the program, written in Fortran, on a time-sharing basis.

After the data has been gathered for a particular client's project, the computer model can be used to test the feasibility and desirability of the different configurations the client has in mind, she said.

The client at this stage can use the program on his own through the time-sharing facility if he has a terminal linkup and if he pays Leventhal & Co. a royalty fee.

"Big Red is geared toward real estate-related projections and was developed for the unique areas of that industry," said Valachi. "It presents an overall model on a project level. You are not trying to budget as such. The categories are broader, like on-site development costs, off-site costs and preconstruction costs, for example."

Though the computer program does not save time appreciably at the stage when the data is being gathered, it does have the capacity to manipulate the data faster than manual computations could, according to Valachi.

DP Course Set For Santa Cruz

NEW YORK — Summer-on-Campus, an intensive, eight-week, industry-oriented programming course emphasizing practical commercial applications, will be held at the University of California at Santa Cruz from July 6 to Aug. 28 by Software Education Corp.

The program includes modules titled "Introduction to DP," "VS Cobol Programming," "IBM Hardware/Software Overview," "OS/MVS Utilities" and "Virtual Sequential Access Method for Cobol Programmers," a Software Education spokesman said.

All modules reportedly incorporate hands-on lab exercises under the direction of an experienced instructor.

Registration Fees

Participants can register for the entire program or for any of the modules. The fee for the entire program is \$5,500, including meals, lodging, computer time and text materials.

Students participating in only some of the modules will be charged \$750 weekly, which also includes meals, lodging, computer time and materials.

More information can be obtained by writing Sheila Fahrner at Software Education Corp., 1114 Ave. of the Americas, New York, N.Y. 10036.



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30	New York, NY	17	Houston, TX	6	Allentown, PA	22	Providence, RI	10	Lansing, MI
SEPTEMBER		17	Savannah, GA	6	Binghamton, NY	22	Troy, MI	10	Topeka, KS
8	Jackson, MS	17	Washington, DC	6	Hartford, CT	27	Baltimore, MD	12	Chicago, IL
8	Kansas City, MO	22	Chicago, IL	6	Milwaukee, WI	27	Phoenix, AZ	12	Cleveland, OH
8	Minneapolis, MN	22	Columbia, SC	6	Portland, OR	27	Seattle, WA	12	Jacksonville, FL
8	Norfolk, VA	22	Montreal, QUE	6	Sacramento, CA	27	Tulsa, OK	17	Columbus, OH
8	Winnipeg, MAN	22	Omaha, NE	7	Cincinnati, OH	28	Ft. Wayne, IN	17	Green Bay, WI
9	Poughkeepsie, NY	24	Atlanta, GA	7	Madison, WI	28	Vancouver, BC	17	Salt Lake City, UT
10	Albany, NY	24	Cleveland, OH	7	Moline, IL	29	Akron, OH	17	San Jose, CA
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16	Bloomington, IL	OCTOBER		21	Sioux City, IA	4	Baton Rouge, LA	19	Wichita, KS
16	Boston, MA	1	Calgary, ABT	22	Dayton, OH	5	Charleston, WV	24	Little Rock, AR
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CW/6-15

Developed HP MPE Extension

Accomplishments, Age Set Consultant Apart

By Jeffrey Beeler

CW West Coast Bureau

LOS ANGELES — In Hewlett-Packard Co. circles, Eugene Volokh is widely known as an individual of many accomplishments. He recently cofounded his own software firm and single-handedly developed the preliminary version of his first major product, an extension of the Multi-Processing Executive (MPE) that serves as the operating system for HP's 3000 series processors.

From time to time, Volokh also works with HP as an independent consultant, and recently marked his public-speaking debut before three dozen members of the company's

Los Angeles Downtown Local Users Group. On the subjects of MPE and HP's Image data base system, Volokh is an acknowledged expert whose counsel is eagerly sought and heeded both throughout the U.S. and around the world.

But Volokh's achievements, impressive though they are, are only part of what makes his story unusual. What truly sets him apart from the rest of the crowd is his age. Last February Volokh celebrated his 13th birthday.

In an age of inflated rhetoric and rampant verbal overkill, Volokh is one of the few individuals to whom badly overused superlatives like "genius" and "brilliance" can justifiably

be applied. His intellectual exploits make ordinary human enterprises seem humble by comparison.

Although just barely into his teens, Volokh has already finished high school and is well into his sophomore year at the University of California at Los Angeles, where he recently won a Chancellor's Scholarship, one of the university's most prestigious awards. Thus far, he has compiled an A-minus grade average while taking a full academic load that includes courses in subjects like abstract algebra, theoretical computer science, group theory and physics.

In addition to his academic pursuits, Volokh holds a part-time job at

R&B Enterprises, Inc., a local real estate and development firm where he spends about 18 hours per week doing tasks like debugging systems and applications programs for his employer's HP 3000 Series III.

He also works on a contract basis with HP, which periodically assigns him to projects aimed at boosting the Image software product's speed or improving its "friendliness." Volokh describes most of his consulting work with HP as fairly routine.

In his off hours and during the weekends, Volokh helps to guide the fortunes of Vesoft Consulting Co., a software house that he and his father Vladimir started here last September.

Vesoft serves as the marketing vehicle for the father-and-son team's two main products: MPEX/3000, an MPE extension that allows users to compile multiple programs or change multiple source files with one command; and Streamx/3000, a utility that reportedly simplifies the changing of systems passwords. MPEX was developed by the younger Volokh; Streamx, by his father.

Brains and Elbow Grease

How does a 13-year-old youth manage to juggle so many challenging professional activities simultaneously? Part of his secret is sheer intelligence. The last time Volokh took an IQ test he scored a stratospheric 206.

The other part of his secret is elbow grease, pure and simple. Volokh describes both himself and his father as "classic workaholics" who often labor as many as 16 hours daily.

Volokh, who emigrated to the U.S. from the Soviet Union six years ago with his family, first attracted public attention not as a programmer or computing specialist, but as a mathematician.

Although Volokh remains keenly interested in mathematics, his most consuming passion these days seems to be computers. "I'm a systems programmer at heart," he said. "I don't like applications programming, which is basically just nuts and bolts."

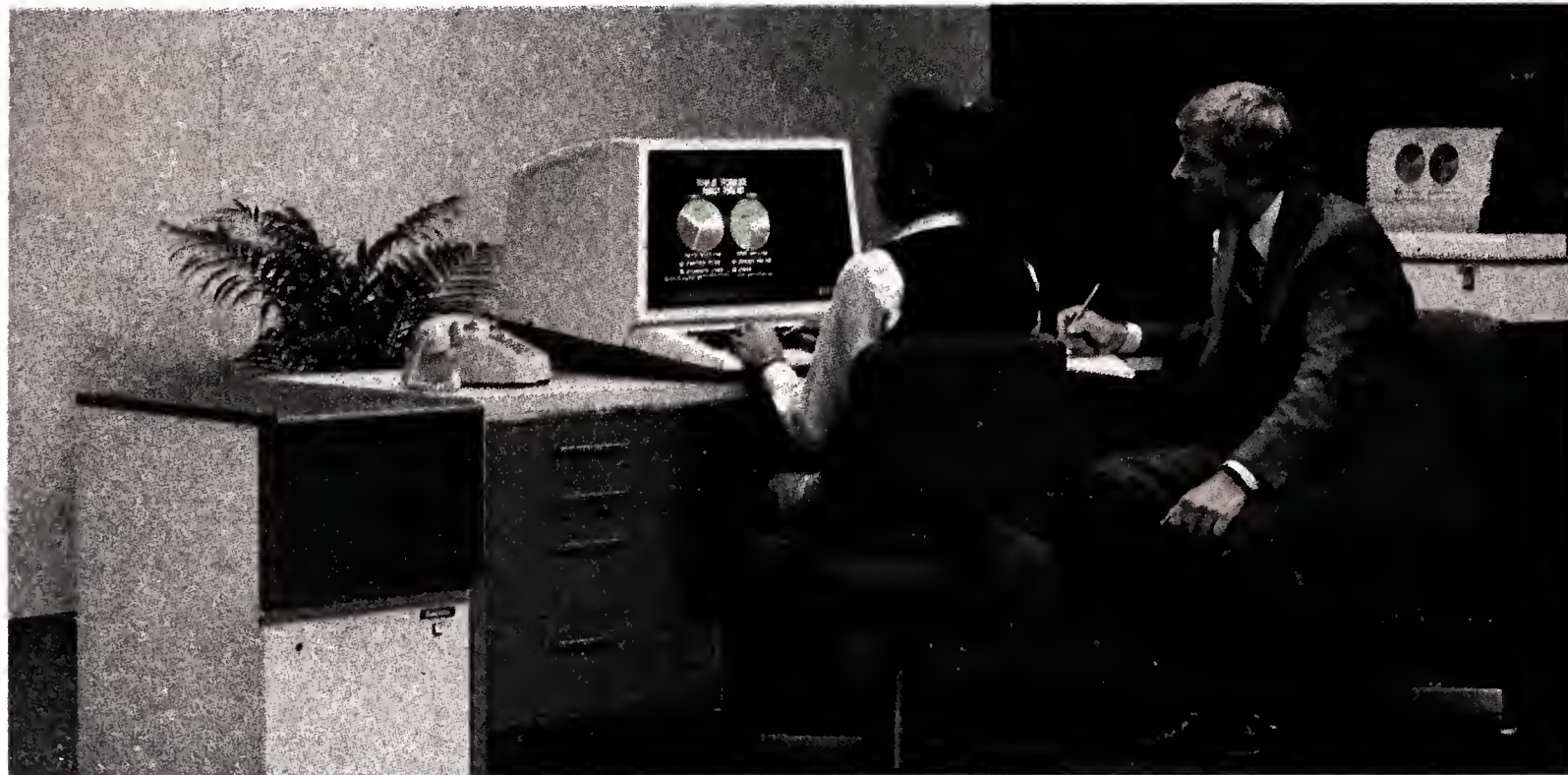
In the three years or so since he wrote his first commercially useful program, Volokh has learned five programming languages, including APL, Fortran, Basic, Cobol and SPL, an Algol derivative in which MPE is written. Of these languages, his favorite is SPL, which he describes as "efficient, pleasant and structured."

As for his long-range professional and academic goals, Volokh is still keeping his options open. "At the moment, I want to get even more expertise in the HP field, and I want to build up a reputation for myself as the inventor of MPEX," he said. "I also want to increase my professional knowledge. Beyond that, I don't have any particular plans."

Volokh is already well on his way toward achieving his goal of establishing a solid professional reputation for himself. He was scheduled to speak recently at the HP General Systems User Group's annual international meeting in Orlando, Fla., and is already fielding technical inquiries from several locations overseas.

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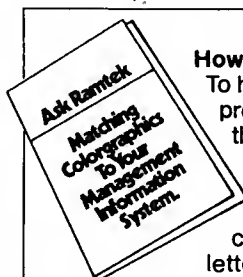
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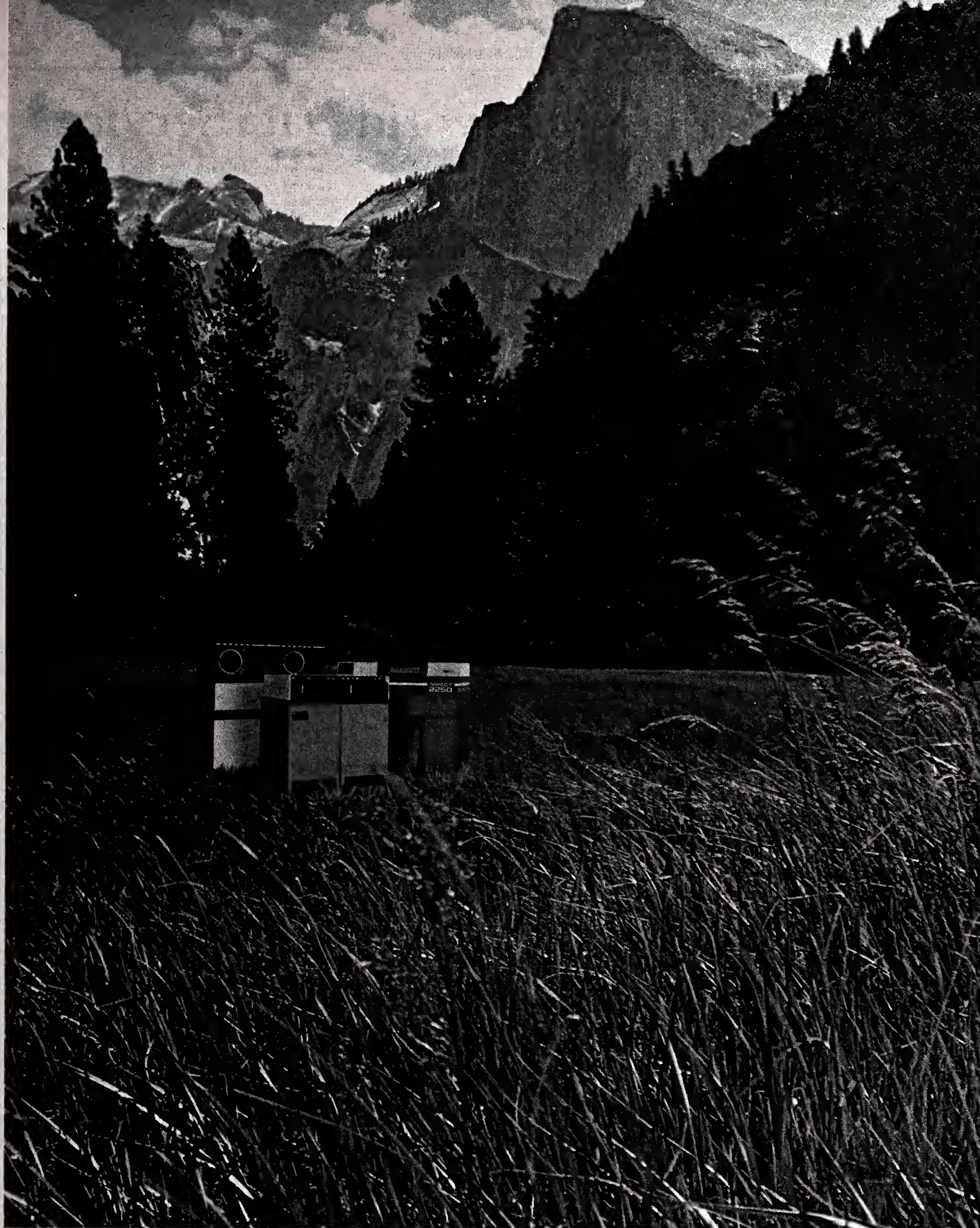


How do colorgraphics fit into your MIS picture? To help you evaluate the business graphics products on the market, Ramtek has prepared the booklet, "Matching colorgraphics to your Management Information System." It's Issue Number 5 of Ramtek's Use Our Experience Series. To get your free copy, write to Ramtek on your company's letterhead.

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Prestel Claims Lead in World Data Service

By Phil Hirsch

CW Washington Bureau
TORONTO — "In March 1981, Prestel passed through the 10,000 set barrier, making it the largest computer-based information service in the world," Prestel Director Richard Hooper reported at a recent conference here. In a paper read at one of the conference sessions, and in an interview with *Computerworld*, Hooper also said:

- Growth of new subscribers is "currently running at a rate of 500 to 600 a month. In the first quarter of 1980, by comparison, monthly registrations were averaging 260.

- At the end of February, 87% of all Prestel users were business customers, the rest residential. Travel, investment, computers and electronics, paper, printing and publishing and education were the major industries

represented by the business users. Ten percent of all users employed television set adapters, which feed signals in through the aerial socket, while the remainder employed integral modems.

Frames Accessed

- Usage of Prestel averages nine minutes a day. Currently, the system handles more than 142,000 frame accesses daily, compared with 56,000

at the beginning of 1980. (A frame access is one frame or page accessed once).

- Thirty-three companies currently supply integral modems for Prestel television terminals. Some units support teletext service as well. Prices range from the equivalent of \$1,200 to \$3,000. The more expensive units include alphanumeric keyboards; the others have numeric keypads. Average

monthly rental price: \$50.

- Eleven companies are producing adaptors. Prices start below \$400; adaptors can be rented for as little as \$5 monthly.

- There is "growing interest amongst the makers of personal computers and office equipment manufacturers in producing Prestel attachments and interfaces. For example, Apple [Computer, Inc.] computers have a Prestel attachment on sale in the UK." Printers are also popular. A Centronics [Data Computer Corp.] printer, which records on a wide aluminized paper strip, can be rented for \$20 a month.

- "Even at mass production levels, Canada's Telidon decoder is four times more expensive than the Prestel decoder."

Private Systems

- Fourteen private videotex systems (terminals and software) are now being marketed in the UK.

- The appeal of transaction-oriented videotex services is suggested by the fact that Prestel is delivering some 1,500 "response pages" daily to information providers.

A response page contains the user-generated information needed by the information provider (IP) to complete a teleshopping sales transaction.

- About 140 IPs are connected directly to Prestel. Since many of them provide videotex services to others, the total number of IPs is about 500. Of the 140 directly connected, 30 IPs account for 75% of the accesses. Hooper estimated that "about a half-dozen of these 30 firms are making a profit." The biggest single user is the *Birmingham Post and Mail*, which offers a teleshopping service.

- At the end of February, there were "well over 200,000 frames" of information in the Prestel data base, and 180,000 of these were in use. Some frames are offered to the viewer at no charge, while others carry a fee, sometimes as much as 50 pence (\$1). The information provider earning the most from frame fees is currently collecting nearly \$100,000 annually.

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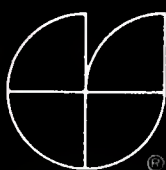
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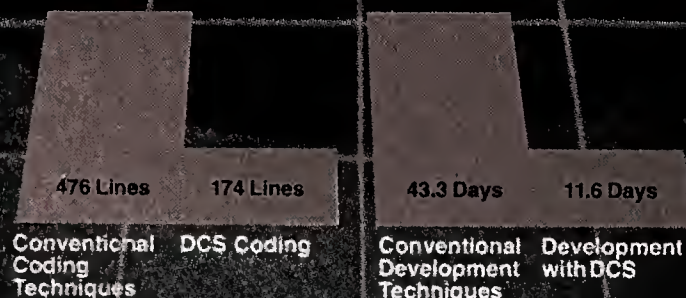
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Largest Potential Savings Area

Teleconferencing Seen Industrial Cost Saver

By Bruce Hoard

CW Staff

WASHINGTON, D.C. — Communications costs amount to 20% of industrial operating expenses and teleconferencing represents the largest potential area for industrial communications savings, according to Jan Loeber, director of cross-industry marketing for AT&T.

Speaking and being seen over a teleconferencing link that stretched 6,000 miles from Pasadena, Calif. to London, Loeber and several other teleconferencing experts imparted a host of helpful hints to attendees at a recent conference here.

The far-flung group of panelists addressed themselves to audio/audiographic and video systems. Audio/audiographic systems include facsimile, voice, slow-scan television and electronic blackboard capabilities. (Slow-scan television transmits still-life photos from remote points and the electronic blackboard is an etching device on which a message is received as it is drawn on the blackboard screen.) A typical configuration costs about \$40,000/location.

The full-motion video system with voice costs from \$250,000, according to Christopher Stockbridge of Bell Labs.

Audio/Audiographic Systems

Audio/audiographic systems are good for multiple and unpredictable locations, large numbers of participants and short lead times, Martin Elton, professor of communications at New York University told the gathering.

Video systems are preferable when "high-value meetings," dealing with such matters as risk or salaries, are being discussed. There must be a substantial budget involved because video is "still, in my opinion, very expensive," he added.

Video is also good for two-location connections, because of switching and protocol problems, in instances where locations are known well in advance, he noted.

Speaking from Tucson, Ariz., IBM's Rick Roland urged his audience to "move slowly if the risk of failure is going to be large."

Aspiring users should take pains to inform their companies what capabilities are available and how they should be used, he said. Some of the options to consider are black and white vs. color, analog vs. digital and

line speeds and costs.

"The worth of a system can only be judged by using it for real tasks," Norman Kenyon of Post Office Telecommunications said from London. Demonstrations and simulations are not suitable substitutions, he said.

"Don't be afraid of structure," was the advice from Telespan, Inc.'s Elliot Gold in Pasadena, Calif. For example, a respected conference leader who has teleconferenced before should be chosen to guide the group, and he in turn should select group leaders at the remote sites.

Indexing is also useful, Elliot explained. All pages should be numbered and the agenda should look

like an outline for easy reading and quick understanding.

Elton listed the main components and costs of a teleconferencing system. The telephone transmitter/receiver is available from about 15 different manufacturers and costs from \$70 to \$2,000, he said.

Bridge Device

The bridge device, which ideally joins all wires together at a point halfway between locations, is also available from the same number of manufacturers for prices ranging from \$1,400 to \$16,000. There are also a limited number of companies that offer bridging services. AT&T offers

a complete line of teleconferencing services.

Bell has been working with an experimental 12-city network it intends to upgrade and make commercially available to 16 cities by 1983, Ed Fontenot of Bell said. That service will offer such options as video taping and audio-only connections.

The telephone company has been using 3M bit/sec transmission rates, but is experimenting with 1.5M bit/sec speeds that would allow transmission over the widely available T-1 carrier lines.

The proposed service will feature satellite and terrestrial transmission, Fontenot commented.



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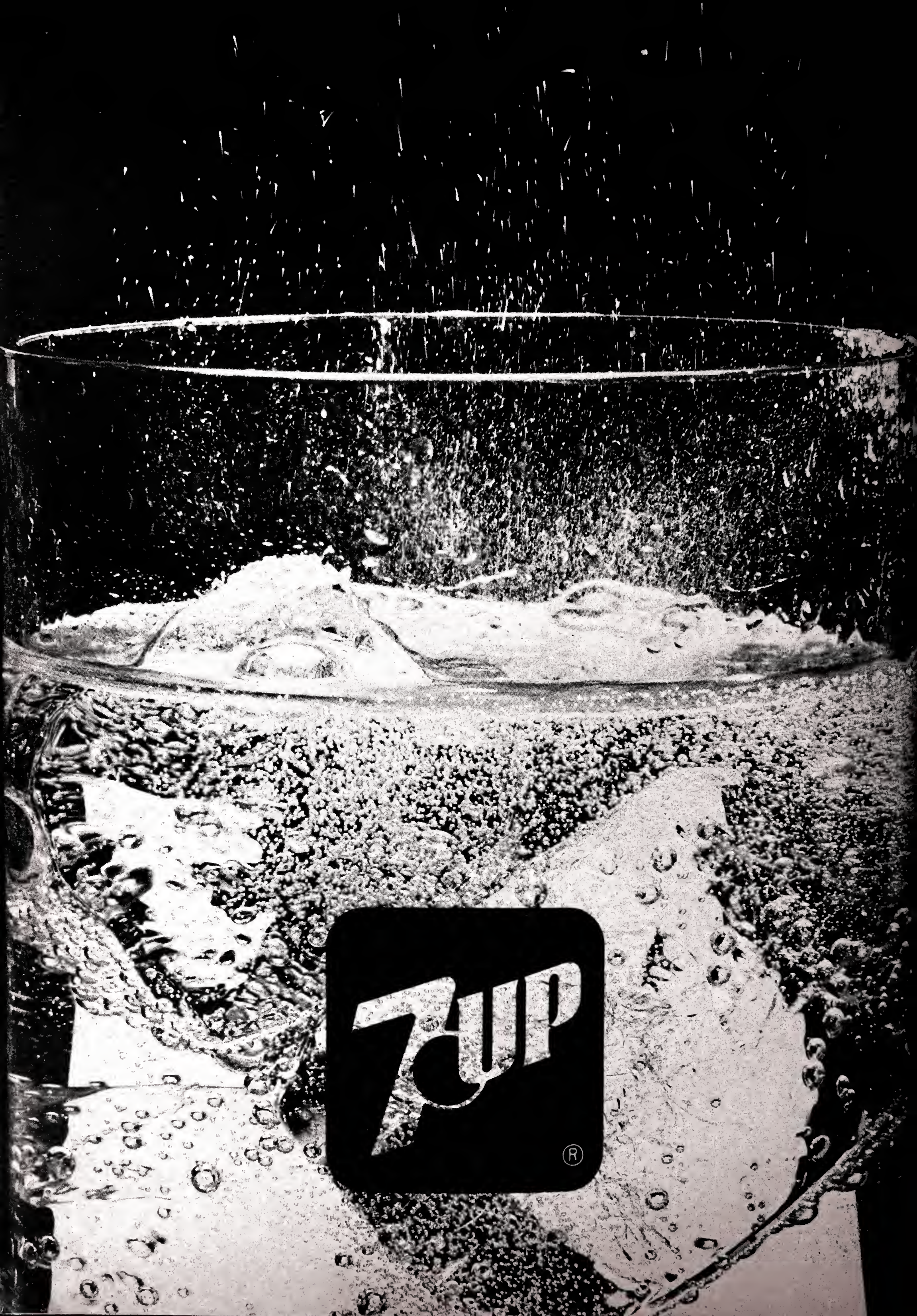
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Commerce's NTIS Offers Free Catalog

SPRINGFIELD, Va. — The National Technical Information Service (NTIS), a division of the U.S. Commerce Department, is offering free copies of its general catalog, which includes information on the high-technology market.

Included in the catalog is a listing of federal computer services, such as programs and data files, a file on foreign technology and patent information, the agency said.

The 32-page catalog, coded as PR-154, is available from NTIS at 5285 Port Royal Road, Springfield, Va. 22161.



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Basis Users Form Group

COLUMBUS, Ohio — Users of Basis, a storage and retrieval system developed at Battelle Columbus Laboratories, have formed a group to exchange ideas and experiences.

The users group will also provide a forum for users to suggest Basis enhancements and provide Battelle researchers the opportunity to discuss state-of-the-art developments in the computer field.

John Stetz of Control Data Corp.'s Cybernet in Bloomington, Minn., is president of the group.

More information on the Basis Users Group is available from Patricia Forman, Battelle Columbus Laboratories, 505 King Ave., Columbus, Ohio 43201.

'Billboard' Magazine Goes Electronic, Spearheads On-Line Service for Radio

By Bob Johnson
CW New York Bureau

NEW YORK — Look out disc jockeys! Even the music business is being touched by computers, and what is often referred to as the "bible of the music business," *Billboard* magazine has spearheaded a national on-line service for radio stations across the country.

The *Billboard* Information Network (BIN) is an interactive on-line reporting system that receives constant input from more than 400 participating radio stations' playlists. Data is reported to *Billboard's* Chart Record Division in Los Angeles and is then offered almost instantaneously to

stations hooked up via telephone lines.

As record playlist information is actually changing at major radio stations across the U.S., it is being processed through the company's IBM 3033 CPU located in its computer center in Teaneck, N.J. It is then available to the 139 stations currently subscribing to the BIN system. Presently, Texas Instruments, Inc. Silent 700 data terminals are being used at *Billboard* for the project.

In addition to a station's playlist, which frequently gives hourly descriptions of how many times a record is played and how it fluctuates in popularity, other data tells of re-

cord station patterns and radio programming formats by geographical areas.

Electronic Magazine

Billboard, which thinks of its BIN system as an electronic magazine, noted that the information is also retrievable by record label, format or artist.

Bill Wardlow, associate publisher of *Billboard* and director of chart research, stated, "Years of special research methodology and music expertise have made *Billboard* a unique resource publication. This is the programming raw material for our computerized BIN data bank. From this proven reference system, we've created an expanded telecommunications service which makes instant information access possible."

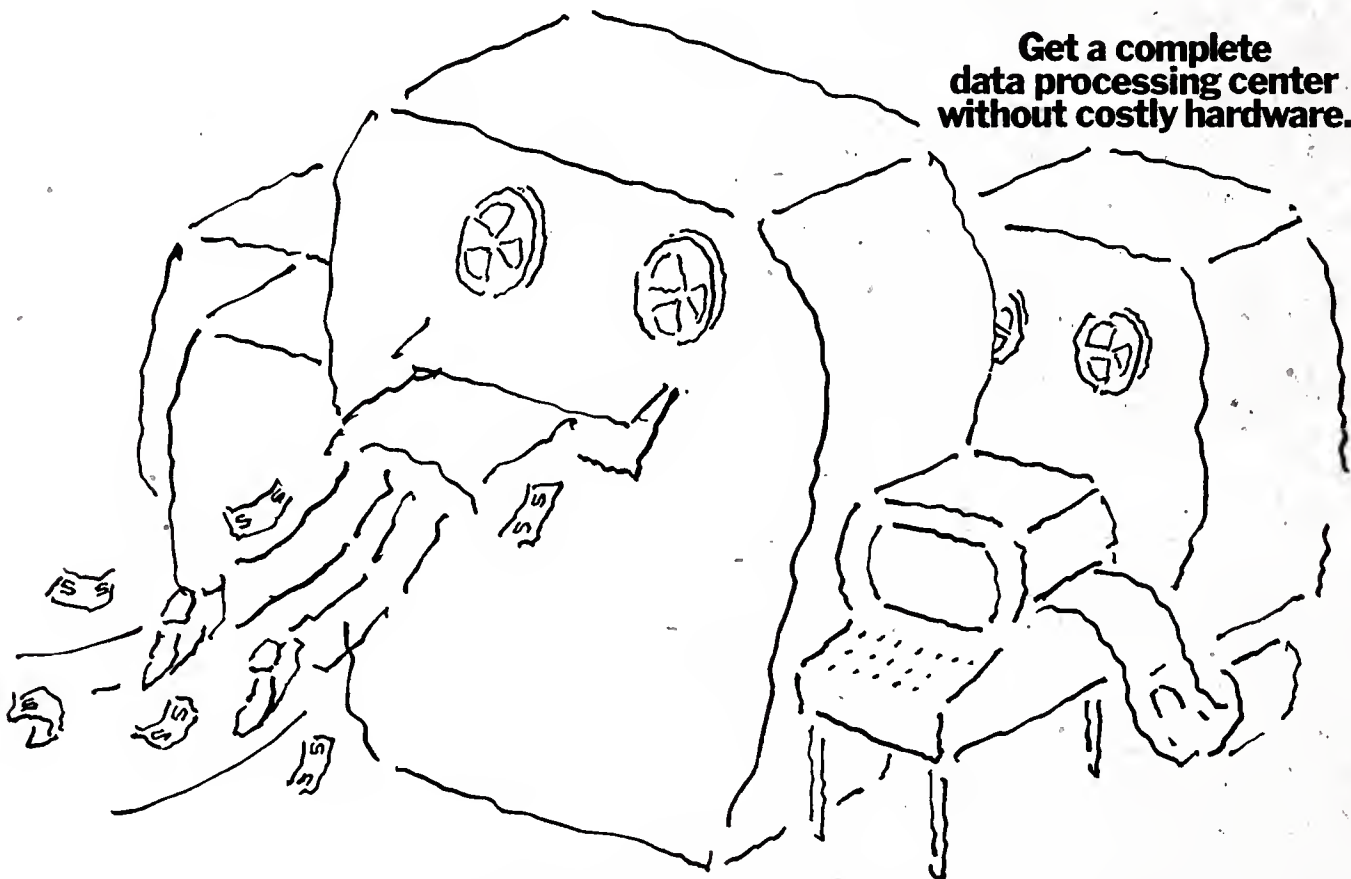
Aya Associates, a DP firm in Teaneck, N.J., that specializes in telecommunications and information systems, worked closely with *Billboard* on the project, and a major part of the software and hardware development was contributed by Bradford National Corp.

The company explained that the system gives station programmers various choices of information, including coast-to-coast breakdowns of stations by region, breakdown of records by configuration and track (single, albums, "cuts") and even a breakdown of airplay activity by record label.

Billboard predicts that this type of quick-access information will have a pronounced effect on the record marketing industry as overnight TV ratings influence program changes in the industry.

Wardlow noted, "This is only the beginning of a multitude of on-line information services *Billboard* plans to make available in the years to come. The prospects for BIN are limitless." He added that in the future this form of electronic publishing may offer such information as recording artists' tour schedules, artist availability for radio guest spots and syndicated programs and news.

The basic BIN service is available to subscribers for \$125/week for four hours of computer time. Additional time is discounted for stations based on the size of their market. More information can be obtained from *Billboard* at 1515 Broadway, New York, N.Y. 10036.



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Mux Forges Steel Company's Systems Link

By Bill Laberis

CW Staff

NASHUA, N.H. — Along with a steel company's rapid growth in the late '70s came a pressing need to forge an economical communications link between a growing number of sales offices and the firm's central processor here.

In particular, Edgcomb Steel Co., a metals service center that buys from the mills and sells to end users, wanted to avoid a repetition of tasks performed on its many asynchronous terminals and thereby reduce wasted CPU time.

"Of course, we decided that the best way to tie our system together was to hook up over leased phone lines, but for costs' sake we wanted just one leased line per location," according to Paul Cully, formerly Edgcomb's manager of systems and programming.

"We wanted to multiplex several terminal ports over one phone line, and we needed to select the piece of gear that had enough error correction and smarts built into its algorithm that it would be tolerant of a very poor quality line," he added.

Cully and his staff first sized up the company's operations needs. Edgcomb's extensive order entry system allows any of its regional sales locations to enter an order on its Digital Equipment Corp.'s Decsystem-10 and run a check against existing stocks in the company's warehouses.

The shipping tags and papers to service orders are routed to the warehouse and used to generate sales reports and accounts-receivable invoices. Purchase orders from the mills are also entered into the system.

"There was a need here for statistical multiplexing in the classical sense," Cully said.

"We wanted to do stat-muxing to keep our terminal speeds high, but such that conditioned lines were not required. That was really important to us because the weak link in the chain is the phone lines," he explained.

Package Choice

Edgcomb settled on the Micro800 statistical multiplexer made by Microm Systems, Inc., and the Micro200 Port Concentrator.

"The package was appropriately suited for us," Cully said. "It was small, did all the stat-muxing functions for us, and the protocols were sufficient to handle the unconditioned lines."

The statistical multiplexer is capable of concentrating the outputs of several data sources into a composite data stream for transmission over a synchronous or asynchronous data link and of demultiplexing the composite data stream to recreate the original independent data channels, Cully explained.

Edgcomb now has two applications that utilize statistical multiplexing. The company uses 4-, 8- and 16-channel concentrators connected to its mainframe. Attached to them are the modems that connect to the leased phone lines, and the terminals are connected to the channel interfaces

at the remote sales locations.

In a typical example of the second application at the data center, a statistical multiplexer connected to a port concentrator allows multiple terminals that print shipping tags to be multiplexed onto one terminal port.

A company spokesman reported that this multiplexer/concentrator combination was "instrumental in saving thousands of dollars associated with adding ports on the mainframe."

Five Ports Freed

When Edgcomb formerly ran the shipping tags application, six jobs, six ports and six teleprinters were used. Now the configuration has been reduced to one job, one port and six teleprinters.

In addition, system efficiency was improved by limiting memory usage and disk activity for this function, the company said. The net result in the time-sharing environment is that more users are able to be on-line simultaneously, and five of those six ports are freed for future expansion, Cully said.

The success of the shipping tag application encouraged Edgcomb to use a similar configuration for two other applications, one to print shipping and processing papers in the warehouses and the other to allow sales personnel to check stock availability in any warehouse.

"We now have the potential to have up to 32 channels or terminals all banging away and talking to a stan-

dard statistical multiplexer and a smaller port concentrator, which in turn would communicate with the statistical mux and give us a single data stream into a single communications line," Cully said.

"We saved maybe \$60,000 on another CPU-line controller, because we are now maxed out [at capacity] on our present line controller," he concluded.

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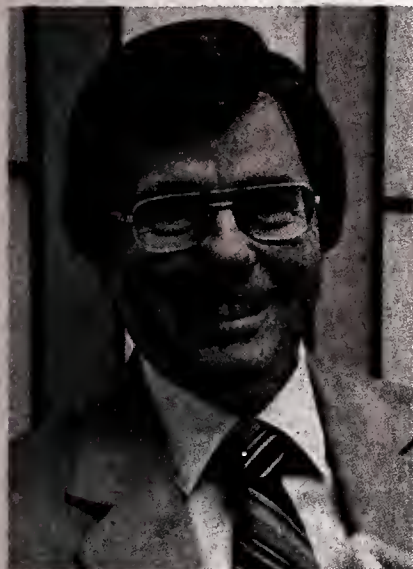
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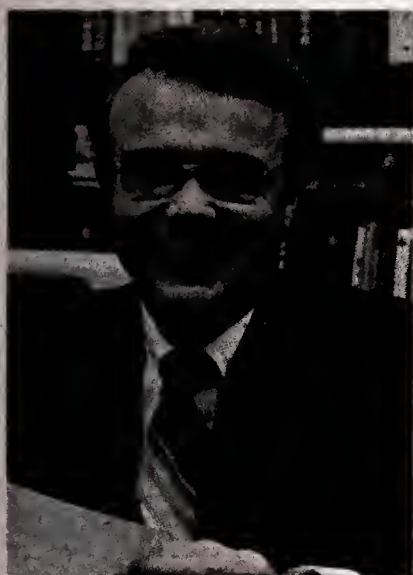
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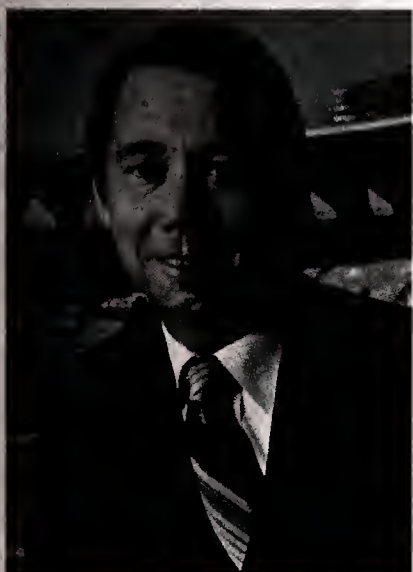
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General Systems Division

Bartender Does Everything But Listen to Complaints

By Bill Laberis
CW Staff

FORT CARSON, Colo. — "Son, this system here will do just about anything; mix and pour the drinks, control the inventory, do the books, all like a really good bar manager. I say just about anything because it's not much good at listening to your personal problems."

But N.B. Miles, branch manager of the Wrangler, the noncommissioned officers club at this military base had nothing but praise for the night spot's computerized bar, despite its obvious conversational limitations.

Installed two months ago, the microprocessor-controlled bartender can mix 1,200 different drinks, all with the precision and consistency that perhaps only a computer could manifest.

In addition, the system may herald an entirely new look in pub design — the bottle-less bar where Joe the barkeep is relegated to the somewhat demeaning role of drink-order taker and server rather than potent potion concocter.

American Beverage Control Corp., which designed and installed the \$37,000 system, said it has set up automated bars in more than 300 locations nationwide, mostly in restaurants rather than in bars and lounges. Yet the company and Miles see it as the wave of the future for watering holes everywhere.

Duties Reduced

His duties reduced to the rigors of the simplest of hand-eye coordination, the bartender at the Wrangler punches in a customer's order on a 200-plus key data entry station. The keys include not only a representation of the drink ordered, but also a picture of the kind of serving glass the bartender is supposed to set up under the pouring tower.

Upon pressing the key, the bartender fires a signal to a waiting RCA Corp. 1802 microcomputer in the "rack room" behind the bar.

Within three seconds the 1802 directs streams of beverages through a network of tubing leading to the pouring tower. And as each ounce of soda, beer, wine and hard liquor leaves the rack room, the system automatically updates the bar inventory, which Miles can receive on a printer at any time.

Once the drink is poured, the sys-

tem spits out the customer's receipt while keeping a running total of the evening's bar tally.

And save money they will, according to both Miles and Bud Nichols of American Beverage.

"The bar can save a lot on inventory costs, which is always a time-consuming thing for a bar manager, and the automatic pouring in exact amounts avoids pilferage, or short changing the customers for that matter," Nichols said. "There are also tax advantages to capitalizing the system, and the bar can buy in half gallons instead of the more expensive quarts. I'd say the payback is anywhere from six to 13 months."

CAM-I to Hold Graphics Expo, Annual Meeting in Fort Worth

FORT WORTH, Texas — Users interested in computer graphics will have an opportunity to compare systems when the Graphics Expo is held here Oct. 27-30 by Computer-Aided Manufacturing International, Inc. (CAM-I).

CAM-I is a nonprofit group engaged in the research and development of computer-aided manufacturing technology.

The Graphics Expo, which will be held in conjunction with CAM-I's 10th annual meeting, will be organized into two parts.

Morning sessions will feature technical papers presented by system users on actual applications

"and also provide vital information concerning justification, implementation, management, support and payback of individual systems," conference organizers said.

The afternoon exhibits will be devoted to user and generic supplier demonstrations of systems described during the morning sessions.

The advance registration fee for the show is \$195 for CAM-I members and \$295 for nonmembers. Further information is available from Rhonda Gerganess, CAM-I, Inc., Suite 1107, 611 Ryan Plaza Drive, Arlington, Texas 76011.



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ST LOUIS — McDonnell Douglas Automation Co. (McAuto) Health Services Division (HSD), the nation's largest supplier of data processing services to the health care industry, recently upgraded its microfiche program to support a growing demand for microfiche services.

McAuto replaced eight cut microfiche computer output microfilm (COM) records and duplicators with four Datagraphix, Inc. Model 4540s and two Datamaster microfiche duplicators. The Model 4540 is a high-speed, high-volume roll film recorder specifically designed to meet the needs of the very active COM operation.

The Datamaster produces duplicate

microfiche at speeds up to 1,300 copies per hour. This combined system improved McAuto's HSD operational efficiency by increasing the capacity for both original film production and duplication. Throughput speed was increased, but labor requirements were reduced. With the required monthly volume of master production close to 220,000 fiche and monthly duplicate production at 600,000, these improvements were a necessity, McAuto said.

Bar Code Design

In order to enhance the 4540/Datamaster system, Datagraphix and McAuto jointly designed a bar code capability to be used to control duplication. The bar codes, generated by

software on McAuto's IBM 3032 and 3033 host processors, are automatically read by the Datamaster to determine the number of copies required for each master, eliminating the need for manual job setup.

This time- and laborsaving system allows McAuto HSD to handle the rapidly increasing data processing requirements of its expanding customer base, a spokesman said.

During the past year, McAuto's microfiche usage has increased approximately 43%, with further growth expected. HSD encourages its customers to use fiche because it helps HSD contain mailing and labor costs. By offering each customer two duplicate copies of each microfiche master at no charge, HSD provides

an incentive to its customers to replace paper output with microfiche. Although some clients still prefer paper, HSD places all customer records on microfiche for their own storage. If a customer decides at some later date to make the transition from paper, the last 18 months' records will be available on microfiche, Datagraphix said.

HSD also uses microfiche within its own facilities; an average of 5,000 masters are produced each week for internal HSD use. Although much of this consists of customer hospital records, other applications are also important. The company generates all of its sysout on fiche.

Job control listings and system dumps are produced daily and distributed to programmers in place of traditional paper printouts. To facilitate distribution, the first three frames of each microfiche are dedicated to internal routing data. This guarantees that output will arrive at the proper destination, McAuto said.

"Prior to converting from our existing cut fiche records, we studied every COM system available. Datagraphix had a reputation for quality, and this was important to us. It's a professional company and, after looking at other systems, we realized that the roll film recorder and high-speed duplicator was the only way to go," HSD DP manager Tony Kinsey said.

Custom Design

Kinsey said the Datagraphix package was custom-designed for McAuto. He added that after looking at other vendors' offerings, McAuto decided the Datagraphix was the only system capable of supporting its high-volume needs.

"Before we went to bar coding, each master had to be 'fed' into a duplicator where the correct number of copies were produced. In order to determine what this number was, operators would search through a job listing. This procedure was repeated up to 6,000 times each day! The listing used for cross-reference was updated with a card deck and it was difficult to keep it current. The entire procedure was slow, cumbersome and not very efficient," he added.

"Duplication requirements at our COM shop differ for each customer and each job. We might have a hundred masters on one roll of film, each requiring a different number of copies. The bar code on each master automatically directs the Datamaster to produce the correct number of duplicates. This is done without operator intervention, and it saves us a tremendous amount of manual labor," Kinsey said.

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To Avoid Life-Threatening Problems

Hospital Cures Power Problems, Ends Glitches

By Bill Laberis
CW Staff

OKLAHOMA CITY, Okla. — Drawing from experience gained at another hospital, the director of clinical laboratories at the University of Oklahoma Memorial Hospital here suspected that power line disturbances were at the root of recurring problems in the hospital's computer room.

Dr. Ronald Gillum was keenly aware that the importance of maintaining instrumentation and computer accuracy is perhaps more pronounced in a hospital than anywhere else. Faulty equipment readings and calculations triggered by poor ac power quality could pre-

cipitate a life-threatening situation.

Sensitive computerized equipment subjected to a series of voltage spikes can easily become damaged and its capabilities weakened, Gillum said. For example, in the case of a blood analyzer used to count red and white cells and measure hemoglobin and red cell size, errors can lead to a faulty diagnosis of anemia or even an unneeded operation.

Gillum's suspicions of power line variations at the hospital were proven correct when a power study using a line disturbance analyzer revealed the hospital's uninterruptible power supply (UPS) was malfunctioning.

He said the problem was compounded by some in-house electrical problems which, along with the UPS, were fixed, restoring clean power.

No Argument

Later, when the hospital's main computer was again found to be malfunctioning, Gillum called in the manufacturer to assess the situation. Confident that the power supply had been demonstrated to be clean, Gillum said there was no room for argument; the computer had to be at fault.

A service team was summoned, hardware problems were detected and repaired and the equipment has been running well ever since, Gillum reported.

When the hospital's 606 Power Line Analyzer, manufactured by Dranetz Engineering Laboratories, Inc., was used again, an automated blood cell counter and calibrator was discovered to be giving erratic and unpredictable results. The analyzer showed that disturbances on the line were not coming from the external power line this time, but rather from within the analyzer. The vendor for the blood analyzer was called and the instrument eventually was replaced, he said.

Because the proper operation of the hospital's laboratory instrumentation is critical, Gillum instituted a policy that requires all sensitive instruments be operated in conjunction with a voltage regulating and impulse suppressing transformer. The resulting improvement in reliability has been "remarkable," he said.

The laboratory recently acquired an automated blood analyzer, Gillum said. Because of a delay in the delivery of a part, the instrument had to be installed without its power conditioner. Before

the situation could be rectified, several power control boards were damaged by line voltage transients.

Even after the installation of correct power conditioning, previously weakened components continued to fail. It was several weeks before all these overstressed parts were detected and replaced, Gillum said.

But the situation is not always so clear-cut, he explained. Another of the laboratory's microprocessor-based instruments includes a

compressor as an integral component. The compressor cycles on and off and, in so doing, generates impulse disturbances.

Gillum said he has demonstrated that these impulses can cause a shutdown of the microprocessor controller. By using the line analyzer and its impulse analysis adapter, he said, he will be able to assess quickly whether the impulses originate from within the instrument or from the outside power line.

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Missouri Child Abuse Hot Line Goes On-Line

By Lois Paul
CW Staff

JEFFERSON CITY, Mo. — A computerized child abuse hot line here is increasing the accuracy and, eventually, the speed of the Missouri Division of Family Services' reporting system.

"It takes a bit longer now until we get used to the equipment," according to Delores Cox, supervisor of the Missouri Division of

Family Services child abuse hot-line unit in Jefferson City.

The hot line went on-line on March 31 after operating for five years in a completely manual system that handled an average of 125 reports daily.

The old system involved a manual search by hot-line workers through three sets of files containing more than 30,000 names of children,

parents or alleged abusers identified in telephone calls.

Calls to the hot line reporting suspected or known child abuse incidents are made by teachers, the police, doctors and others who have frequent contact with children.

Time Limit

Family service workers are required by law to begin investigating a hot-line call of suspected child abuse within 24 hours after it is received.

The procedure with the computerized system is the same. When a call comes in, social workers conduct a name search to determine if the person is known to the Department of Social Services' system.

If it is a new name, a number is assigned to it. In this way, the Division of Family Services can keep track of recidivism rates and can compile profile reports describing a typical client.

The information also can be used to identify high-risk categories so that programs are targeted toward these groups.

John Sanders of the department's DP division said Family Services is in the process of setting up a system whereby data will be sent on tape to the American Humane Society, which maintains a national file of information on child abuse. Currently, copies of manual reports are sent with the names deleted.

The Department of Social Services has an IBM 370/158 with 16M bytes of memory running under MVS to handle the work of its divisions, including the now-computerized Family Services' hot line.

The first on-line application went up three years ago, Sanders said, adding that the department is in the process of expanding this area.

"Currently, the computer is 'maxed out' and response times are beginning to show it," Sanders said, noting that response times currently range from six to eight seconds.

Second System

A second system, an IBM 4300, will be installed in the fall to relieve the current overload, he added.

The Division of Family Services' hot line is connected to the department's main computer via IBM 3270 terminals using CICS communications interface.

"They went from a completely manual system to a full-blown on-line system and handled it very well," Sanders said.

The conversion took a little

more than a year to develop, he explained. About two months before the division went on-line, terminals were available for training and testing. "One day, we said, Tuesday you will be on-line."

The division ran a parallel manual system for several weeks. There are 15 social welfare workers who man the telephones and use the terminals. There also are several clerical people for updating information. One additional staff person was added during the day, the busiest time for the hot line.

"After a hectic first few days, they now have the system down to a science," Sanders said.

"None of the other divisions has access to our information," Cox explained. She cited benefits of the computerized hot line to be the accuracy of the information and the ready access to it.

Formerly, the information was recorded by hand and some time elapsed before it would be available for review. With the terminals, administration also has better access to control measures, Cox added.

Training was conducted throughout a two-month period, she said, during which time staff members spent several hours each day on the system.

"It seems to be off to a good start," Cox said, adding that the terminals are down more frequently than she would have expected. "Those more directly involved with the system told us to expect some bugs. They don't seem to think it is down frequently."

As the hot line has grown and the volume of data increased, the state legislature has begun to see the need for additional speed and accuracy in recording the information, she added.

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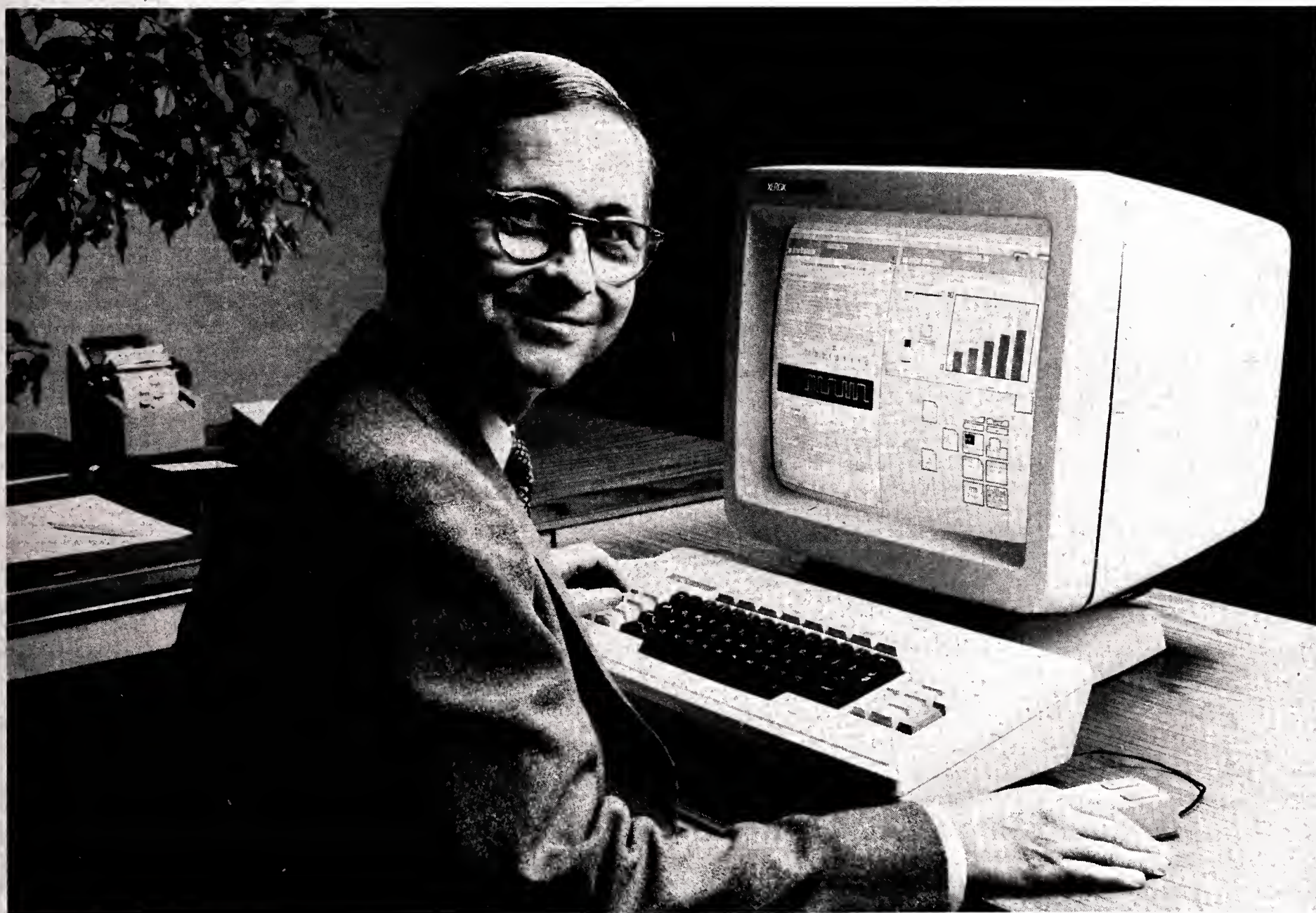


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Nationwide Security Service

Medallion Network Saves Lives

By Bill Laberis
CW Staff

SULLIVAN, Ill. — Two weeks ago in the quiet Massachusetts town of Wenham, an elderly widow lost her balance while reaching in the refrigerator for some milk, tumbled to the floor and smashed her hip in three places.

Unable to get to the phone, she grabbed a watch-sized medallion hanging around her neck, activating a computerized lifeguard network hundreds of miles away.

Within 20 minutes, an ambulance was speeding the woman to a local hospital, her family and a neighbor had been informed of the accident, and awaiting doctors had been apprised in advance of her medical history, including sensitivity to drugs.

The woman is one of more than 5,000 subscribers to Lifeguard Systems, a computer-based security service designed to give users an extra measure of protection from a variety of potentially devastating circumstances.

Initial Fee

For an initial fee of \$800 and an annual \$180 maintenance charge, subscribers are outfitted with a neck pendant or wristband containing a silicon microtransmitter.

In an emergency, the user presses a small black button on the transmitter, which sends an FM signal to a lunchbox-sized communicator located in the user's home or office. Superimposed on top of the FM signal are two AM signals to block out interference from high-tension wires or passing planes. The transmitter has an effective range of about 175 ft.

Once activated, the communicator automatically sends a signal over the telephone lines to one of three computer centers located in the East, Midwest and West. Company

founder and president Ralph W. Kirk would not pinpoint the centers' locations "for security reasons."

At the computer center, the signal is electronically sorted and the user's file is retrieved from a computer data base and sent to a CRT terminal, all within 30 seconds from when the black button was depressed.

Range of Information

"The data file contains a range of information about the person in trouble, information we get from an interview and client counseling," Ronald Myers, Lifeguard service representative, said.

"It has their name, address and nearest cross street, any potential health problems such as heart trouble or seizures, preference in hospitals and the phone numbers of the local police, fire department, a neighbor and family members."

Myers said a growing number of subscribers are buying protection against intruders, and some are adding an optional screech alarm to their communicators.

Once the information flashes up on the CRT, the operator dials the user's number to confirm the emergency. If there is no answer within four rings, the operator begins phoning the list of emergency numbers, starting with the police.

"We tell them that there has been a call for emergency help received

from such and such an address and that the person has epilepsy or heart trouble or has had their apartment burglarized a lot recently — whatever the subscriber tells us in the original interview," Myers said.

While conceding that most subscribers are elderly, Myers said it is usually the children of the subscribers who buy the service rather than the elderly themselves.

"But lately we are sensing a lot of interest from large corporations whose executives travel a great deal," he said. "Because their wives are often left alone, the executives are buying protection from intruders, and the companies are willing to pay for protection against extortion should someone break into the home and threaten an executive's wife."

The system also is equipped with fire protection capabilities. A smoke and heat detector, if activated, sends a special signal to the computer center to alert an operator of a fire.

After checking by phone again to verify the emergency, the operator can call in the local fire department.

In the near future Kirk said Lifeguard will offer a medical counseling service whereby operators will periodically phone the sick at home "to check and see how they are doing." The call will be followed by another to the user's family, giving a weekly or monthly report of the user's condition based on the first call.

Law Librarians To Meet June 27

WASHINGTON, D.C. — The impact of electronic media, telecommunications and the development of public and private data bases on the teaching and practice of law will be covered at the 75th anniversary meeting of the American Association of Law Libraries here from June 27 through July 2.

The theme of the conference is "Legal Information for the 1980s: From Quill to Computer."

Conference speakers will include consumer advocate Ralph Nader; Wade McCree, U.S. solicitor general; Patricia M. Wald of the U.S. Court of Appeals for the Washington, D.C., circuits; Otto M. Kaus, a recent appointee to the California Supreme Court; and L. Chet Haworth, legal industry analyst for AT&T.

Registration for the conference, which will also feature a product exhibition, costs \$85. Further information is available from Antoinette Russo, administrative secretary, American Association of Law Libraries, 53 W. Jackson Blvd., Chicago, Ill. 60604.

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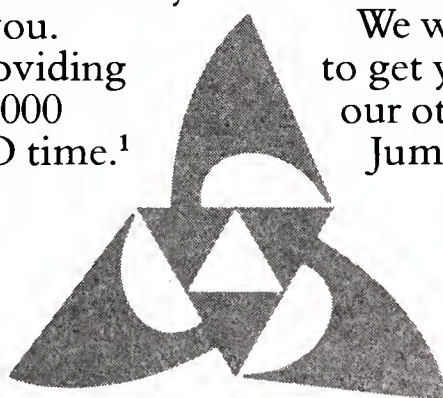
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Software Helps Hospital Remedy Payroll Errors

By Deborah Wise
CW Staff

TOLEDO, Ohio — When The Toledo Hospital, a 744-bed facility with 3,800 full- and part-time employees, exceeded its payroll budget by \$1 million and didn't know why, it decided to install a computerized payroll personnel management system to keep track of spending.

"Budget overruns made us realize that the ability to

forecast, control and manage personnel expenses was crucial in our efforts to meet cost containment objectives," said Susan E. Mainwold, the hospital's director of marketing.

Although James Hartmann, the director of personnel, is not a computer expert, he knew what he wanted from the system. Since it was not available on the market, "we figured out the concepts

with a software house and had them customize the system to our specific needs," Hartmann said.

From DP Consulting

DP Consulting, a West Virginia-based software house, developed the Total Online Payroll Personnel System (Topps) around the NCR Corp. I-8000 series computer.

The Toledo Hospital has an NCR 8250 computer with

9,600K-byte memory and six CRT terminals in the various hospital departments. "It's a fantastic system. One of the best," Hartmann said. He described the advantages it has over the manual record-keeping system the hospital used to use.

The system incorporates three interactive modules for personnel, labor and payroll management to eliminate much of the interdepartmen-

tal paper pushing that caused the inefficiencies.

The personnel management module identifies by employee each department's total personnel budget, using input from time cards to keep track of the number of actual hours each employee works.

"Before Topps, it was difficult to keep an accurate record of the actual hours some 3,800 employees were working," Hartmann said. Part-time employees would become full-time without the personnel department's knowledge, making it impossible to know exactly what positions in which departments were creating budget variances.

Key Control

"Now our scheduled versus actual hours report, issued within two to three days of each payroll, pinpoints these variances. This is our key control mechanism for operating within authorized budget hours," Hartmann added.

When accurate tabs are kept on job positions a report can be generated to help the recruitment process. The system also reports staff vacation schedules, making departmental reorganization simpler.

The labor management module collects information from the personnel module to use in forecasting budgets and personnel requirements and to pinpoint problem areas.

Hartmann said a major advantage was the report-writer capability, which put this information into document form quickly for use as a management tool.

Program's Third Module

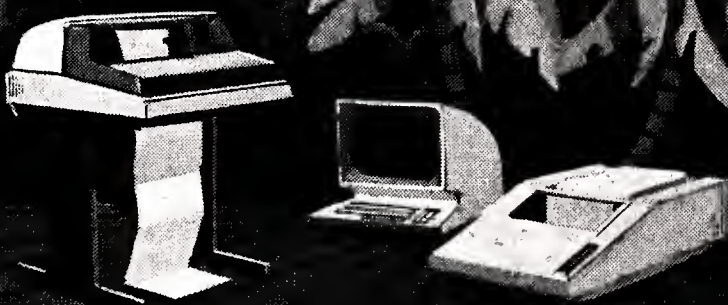
The third module controls the hospital's payroll and has reduced errors in accounting and speeded up this process. "Employees like the new system because they receive cash and other benefits promptly and the likelihood of payment omissions is reduced," Hartmann said.

The benefit information is printed out on employees' check stubs and is also sent to department heads. This enables managers to monitor overtime, sick time and vacations on a regular basis.

The system is scheduled for an upgrade this spring, according to Hartmann, who said the hospital is adding a productivity indexing system to the program. The system's maintenance is done by the software house rather than NCR.

The Toledo Hospital is marketing Topps. To date, it has sold the system to six other hospitals and has had inquiries from hotels.

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Firm's Timesaver Proves Prime Decision Tool

TORONTO — A software package that was purchased as a timesaving device for yearly budgeting evolved into a prime tool for decision analysis and strategic planning for Abitibi-Price Fine Papers here, according to its controller, Derek Cathcart.

The company, which is the world's largest manufacturer of newsprint and a leader in fine paper products, had a number-crunching problem that made yearly budgeting extremely time-consuming.

After deciding that the answer would be a software package, the company considered a number of packages, including S.S.I. International, Ltd.'s Simplan; Cuffs Planning and Models, Ltd.'s Cuffs; EPS, Inc.'s FCS-EPS; and Foresight Sys-

tems, Inc.'s Foresight, which already was being used in-house.

"We bought a consulting report and tried to find out which modeling language would be better suited to our longer term needs," Cathcart said. The analysis led to the purchase of Execucom Systems Corp.'s Interactive Financial Planning System (IFPS) in 1977. The reason for the choice, according to Cathcart, was "ease of use and power."

Wider Uses

Cathcart explained that computer-based strategic planning at Abitibi-Price literally began with the acquisition of IFPS software.

"We found that the same software which could handle the grinding of

budget numbers could be strategically used in countless applications which would substantially increase our overall productivity and efficiency.

"Because of the capital-intensive nature of the paper manufacturing business, with its expensive machinery, large inventories, the need for process modifications and fluctuating prices, it is absolutely necessary to use a decision-support system to track accurately and precisely our manufacturing capacity and utilization," Cathcart explained.

"With the marketplace affected by so many internal and external variables, we need to ask 'what if' questions about every aspect of our business," he added, and IFPS has

enabled Abitibi-Price to accomplish this.

Abitibi-Price initially used IFPS through Control Data Corp.'s time-sharing system. Currently, it is used with the company's in-house equipment, an IBM 3031 with 4M-byte memory.

The company's use of IFPS began with budgeting, progressed to the discipline of strategic planning and currently is used for a monthly analysis of overall company transactions, according to Cathcart.

IFPS projections are applied to product costs, competitive product pricing, projecting supply and demand factors and other applications.

"IFPS has been unbelievably simple to use," Cathcart said, noting that most of the 30 to 35 people who use the system are not DP-oriented. "IFPS gives them a computer-based planning tool which can be accessed through common business terminology," he said.

"Figures that used to take six weeks to grind out now take a couple of days." IFPS also enables Abitibi-Price to see a clearer picture of overall company status that enhances senior managers' productivity, he added.

Study to Track Oil Heat Usage In N.J. Homes

PRINCETON, N.J. — A study of home heating oil conservation patterns using data collected from an on-line heating oil delivery system and sponsored by the U.S. Department of Energy has been launched by Princeton University's Center for Energy and Environmental Studies in collaboration with Petroleum Data Corp. (Petrodata) and F.C. Haab Co., Inc.

Petrodata developed its on-line service 10 years ago.

The firm now uses an Amdahl Corp. 470 mainframe to provide information to its 250 heating oil dealers in New Jersey which deliver to more than 750,000 residential customers.

System Development

"The system was developed to refine calculations and to make projections on the amount of oil our customers use more accurate," according to William D'Ambrosio, of Petrodata Corporate Communications Department.

"It predicts when delivery should be made to customers, and it takes into account different conservation improvements that are made to the homes, like insulation and day/night thermostats, to change consumption levels," he continued.

The Princeton University study will use the data that oil dealerships like F.C. Haab Co. collect on individual customers. It is hoped that patterns will emerge that, based on today's usages, will help predict what will happen in the future, D'Ambrosio said.

The study is expected to take up to a year.



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July 20-24, Santa Cruz, Calif. — **Microcomputers: Current Capabilities and Future Prospects.** Contact: Adele Wood, University of California Extension, Carriage House, Santa Cruz, Calif. 95064.

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July 23-24, San Francisco — **Automated Tools for Software Engineering.** Contact: Software Research Associates, P.O. Box 2432, San Francisco, Calif. 94126.

July 26-29, Minneapolis — **Optical Character Recognition Users Association's Summer Conference.** Contact: Optical Character Recognition Users Association, 10 Banta Place, Hackensack, N.J. 07601.

July 26-31, Denver — **Fifth International System Safety Conference.** Contact: Publicity Office, 145 E. Costilla Ave., Littleton, Colo. 80122.

July 26-31, Cambridge, Mass. — **International Conference on Management Graphics and Computer Mapping.** Contact: Harvard University, Graduate School of Design, Laboratory for Computer Graphics, Cambridge, Mass. 02138.

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Before It's Too Late

DP managers should consider whether the parade is passing them by before they march themselves into corporate limbo.



LETTERS

Computer programming is a profession that takes years to master. No one would consider training a programmer to be a teacher with a short course in education, would they? In trying to do the opposite, I think some believe that programming is

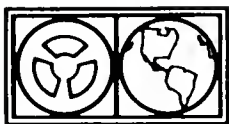
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DATA PAST

Among other things, the agency would seek to break up "existing oligopolistic industries so that no industry would have four firms producing more than 50% or eight firms more than 70% of the relevant market."

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READER COMMENTARY/Richard L. Hudson

No Personnel Crisis Here

While the specter of rampant turnover hangs over the heads of most data processing managers, I had no turnover of my professional staff in 1980 or 1981. The rates for the entire department dropped from a recurring annual rate of 50% to 16% in 1980. So far in 1981, it's 0%.

These figures are of particular importance in light of the healthy condition of the Houston economy, coupled with the city's growth rate — fastest among the nation's 10 largest cities. The recruitment of experienced personnel is fierce and most of my employees receive "pitches" at least once a week about available job opportunities. Indeed, in some instances a \$1,000 to \$2,000 bonus has been dangled in front of their eyes.

Despite all this, I anticipate improving upon last year's turnover percentage and feel strongly that 1981 will mark my second consecutive year with a 0% turnover rate among my professional staff.

Some of the contributing factors are the following:

A) **Growth:** Big Three had a 1M-byte IBM 370/138 in 1980. In January of this year, we installed a 4M-byte 4341 with installation of a second similar CPU scheduled for later this year.

Our network used to consist of 25 local terminals and a single dedicated line with one CRT terminal attached. In the past five months, we have installed seven dedicated lines to 29 cities with more than 130 terminals attached. Our local network will double in size upon arrival of our second 3274.

An additional 20 cities are to follow suit by early 1982.

The initial impetus for this spurt is an on-line perpetual inventory/sales system.

An aggressive program of acquisition of "canned" software packages over a period of two to four years is the next goal.

By bringing many projects for our subsidiaries in-house and developing a word processing system for our users, we helped to create an atmosphere of change, enhancement of status and position within the corporate structure. This newfound respect and acceptance is critically important if dedicated professionals are to remain.

B) **Compensation:** I serve on the board of governors for a local annual salary survey of the DP market.

Our salaries range from the high \$20,000s to the mid-\$30,000s. In the Houston marketplace, we are extremely competitive. In addition, all employees are evaluated and reviewed at six-month intervals. Merit increases are not standardized and may vary significantly between employees or from raise to raise.

Compensation is important generally at the time of hire and for a short period around review time. During the balance of the year, other factors play a more important role in retention of employees.

Communication With Users

In addition, to the two areas previously addressed, the opportunity for the programmer to communicate directly with the user has done much to create an aura of mutual respect and understanding. Formerly, a user would submit a request in writing and the programming staff would generate results from a "mole-in-the-hole" environment. Rarely would the finished product accommodate the user's needs (for a variety of reasons).

Now the specifications are written by both parties together. Regular meetings allow for modification and considerable flexibility along the way. The biggest plus is a mutual appreciation of each other's problems and talents. Two years ago, the DP department was the Rodney Dangerfield of the company. Through the important ingredient of communications, our department is now extremely well regarded throughout.

All of our programmers have their own IBM 3278 or 3279 CRT terminal. In addition, the maintenance duties are shared by all and not dumped on one individual. Neither are staff members assigned to a single project for more than a year at a time if such requirements could present themselves. There is not, however, a policy of job rotation, but we do reassign people from time to time in order to avoid stagnation.

Professional growth through exposure to a changing environment, training, communication and regular evaluations have created the zero

(Continued on Page 56)

SOFTLINE/Werner L. Frank

Software Productivity and Your Budget

In a recent column, we considered the limits to productivity improvements achievable through applying the best available methodologies and tools in support of custom application development projects. We concluded that a productivity increase of 75%, or a 43% cost reduction, was generally the outside achievable limit [CW, May 4].

But what does this mean in terms of dollar value and DP budget implications? The annual expenditure analysis of DP budgets performed by International Data Corp. (IDC) noted that almost 50% of the DP installation's costs are consumed by manpower. Of this amount, roughly one-half is devoted to the programmer/analyst staff, including supervision and management costs.

If an overall cost reduction of 43% is possible in application development and operation, then by using all

available productivity tools it should be possible to save close to \$6 billion on the 1980 estimated personnel budget of \$26 billion. Since most installations already employ some of these techniques and not all of them may necessarily apply, a more realistic potential savings might be \$4 billion, or about 8% of the total DP budget.

Let us now consider another alternative to improving the productivity of the in-house development and operations staff. We investigate the impact on the DP budget of shifting expenditure from in-house staff to the purchase of software developed outside.

Note the staffing organization shown in Figure 1. This indicates that 41% of all the installation line personnel are devoted to development and maintenance. By removing some of the programmer/analyst team and a portion of management, we postulate a 20% reduction in total staff. This reduction in the higher paid manpower could have an overall favorable expenditure variance of 25%.

We now apply these observations to the 1980 user expenditure figures, as shown in Figure 2. By reducing staff

(Continued on Page 56)

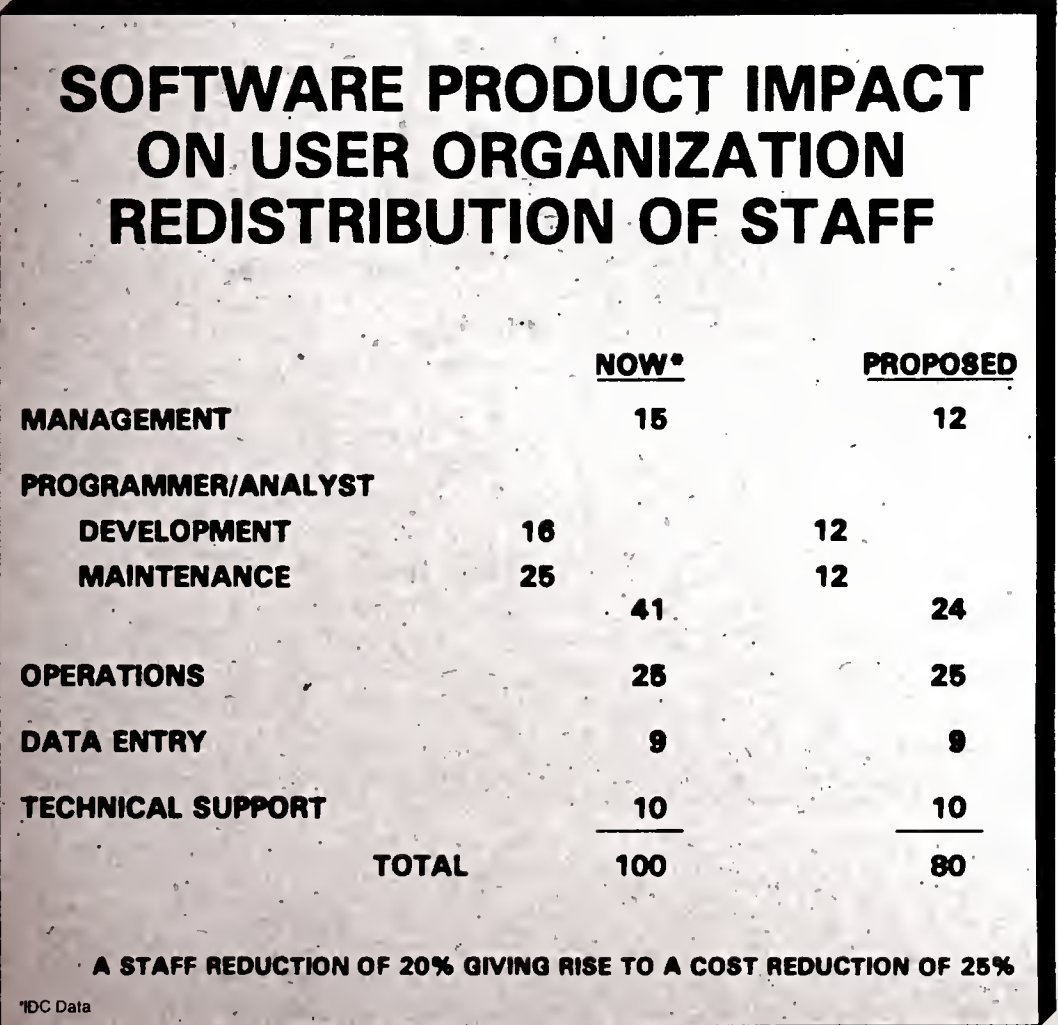


Figure 1

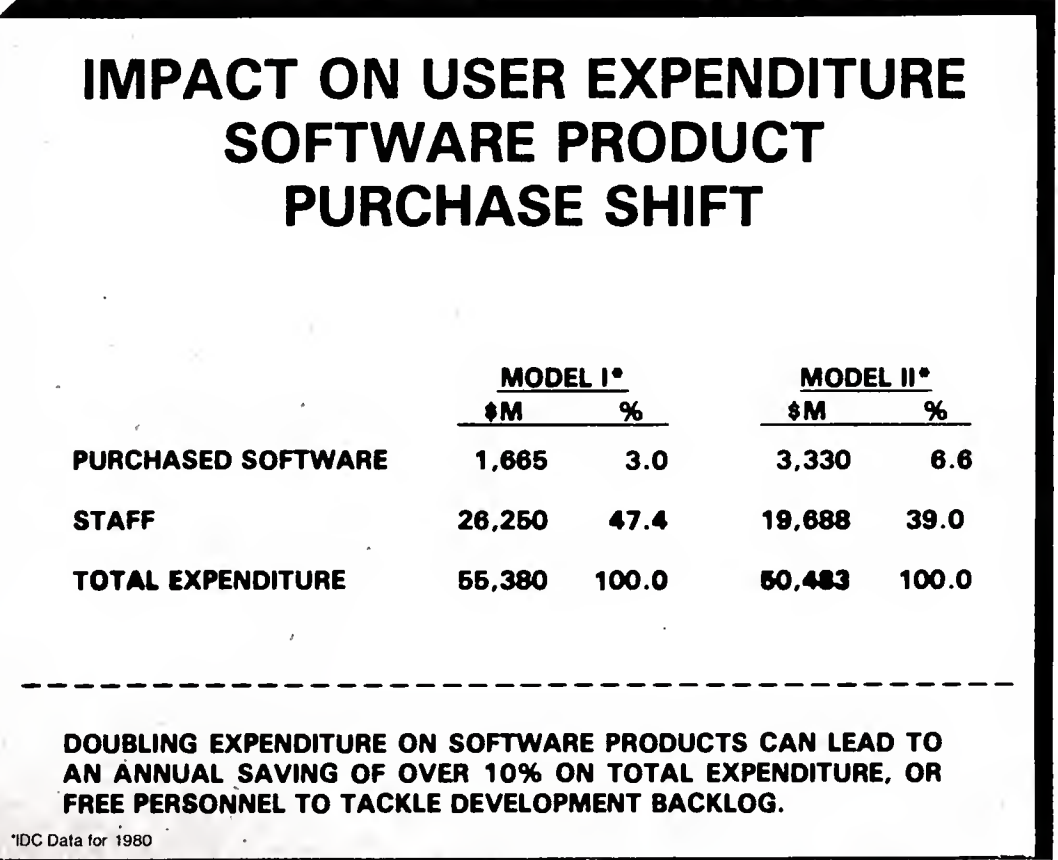


Figure 2

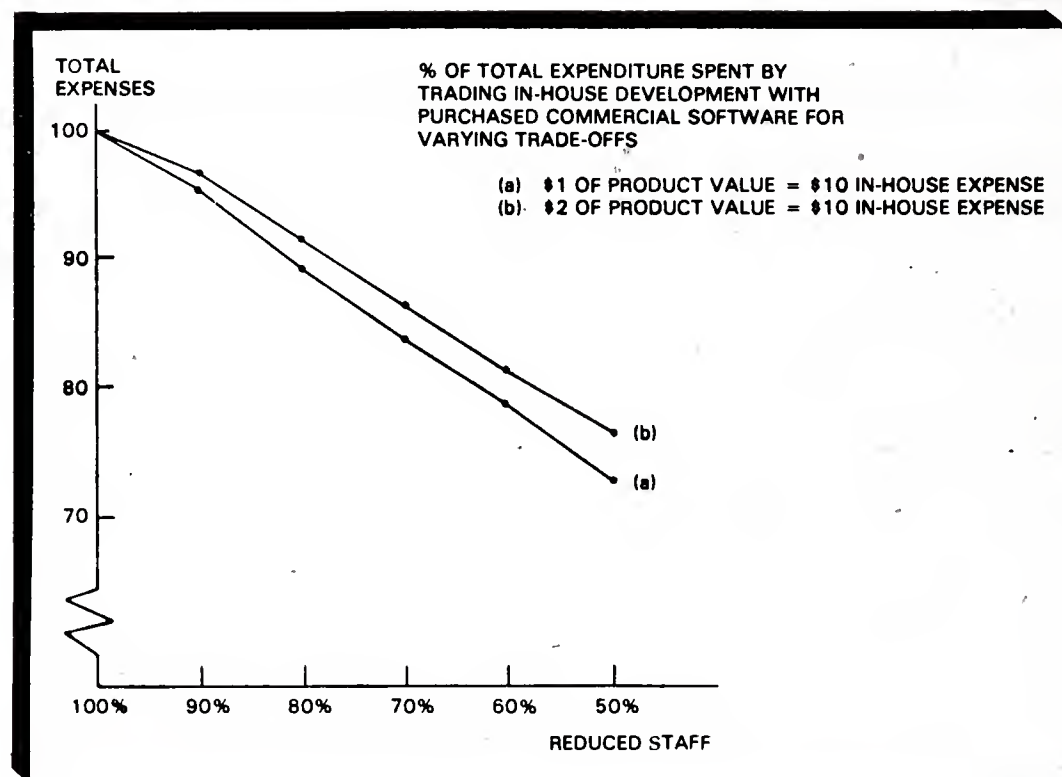


Figure 3

Software Productivity And Your Budget

(Continued from Page 55)

costs 25% and doubling expenditures for purchased software, the overall savings is approximately 10% of total cost. This conclusion rests, however, on the assumption that \$4 of in-house staff costs can be replaced by \$1 spent on purchased software.

Unfortunately, no one knows what the trade-off is between building custom software with an in-house staff and purchasing off-the-shelf software products. But one can do a parametric study and see how sensitive this function is to varying assumptions. In Figure 3, we note the shape of the trade-off curves for several cases.

Basically, the "savings" potential, as a percentage of total expenditures, varies slightly for these cases. A realistic range of staff reductions, up to 25%, shows the savings potential is bound to be 15%.

This leads us to a final observation concerning the remaining potential open to users for exploiting productivity increases. Again using IDC data, we note the relative DP installation expenditure rates for the following items: total expenditure — 33, hardware and communications — 12, operations and software maintenance — 12, miscellaneous — 5, internally developed software — 3, purchased software — 1.

The figure for internally developed software is derived by assuming that 20% of staff budget is spent on new development efforts.

These ratios tell us that for every \$33 spent in the typical DP installation, only \$1 goes to purchased software. This sharply contrasts with the \$12 going to hardware and communications, \$12 to operations and software maintenance and \$3 to new development.

Users, therefore, have quite a bit of flexibility available for helping their budgets and improving their operational efficiency. Productivity increases can be achieved in two independent ways, when applicable:

1. Incorporation of implementation tools and procedures.
2. Use of purchased software.

The improvement to user budgets for these alternatives can range to 8% and 15%, respectively, and in combination may even be able to reach 20%. Such benefits can either serve to reduce overall costs or make it possible for an organization at a fixed expenditure level to perform more processing and cut down its backlog of application needs.

Frank is executive vice-president of Informatics, Inc. in Woodland Hills, Calif.

No Crisis At This Site

(Continued from Page 55)

percentage turnover we experienced in 1980 and so far in 1981.

The entire department is informally reviewed on a regular basis through recognition of accomplishments in areas such as:

- Performance of task.
- Service anniversaries.
- Attendance.
- Extra effort.
- Interfacing with users.

Our attendance has dropped from a department average of 13 days in 1979 to 4.84 in 1980. I have not had a computer operator miss a day of work or arrive late in 20 months!

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Hudson is manager of data processing at Big Three Industries, Inc. in Houston.

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HUMAN CONNECTION/Jack Stone

NCR Users Confident in Face of Growth

Last week's column briefly described how the Federation of NCR Users Groups (Fnug) and NCR Corp. are encouraging NCR installations to hit hard at problems of DP personnel — particularly education and productivity, which Fnug leadership feels is the most serious DP management challenge of the '80s.

Fnug's farsightedness prompted me to arrange interviews with members of its executive board to find out their assessment of recent progress at NCR installations and their outlook for the future. Current board members I talked with included chairman Roger Stephens (Price Brothers, Dayton, Ohio), vice-chairman Dennis Caldwell (Recreation Equipment, Seattle) and membership registrar Don Masterson (Midland Cooperatives, Minneapolis). I also chatted with some past chairmen of the group: Jim Krautkremer (Midland Cooperatives, Minneapolis), R.H. Vandenburg Jr. (Jefferson Data Services, Richmond, Va.) and Charlie Yahn (United Associated Grocers, Robeson, Pa.). All these people have had heavy experience in the computer systems business and are senior managers in their respective installations.

No Major Problems

I would say the group is pragmatic and evidenced a sense of serenity about their operations, reported no major problems that were not under control and felt confident about meeting their growth objectives.

Their comments were generally consistent and could be summarized — mostly in my own words — as follows:

- NCR hardware improvements during recent years have been extremely impressive. In addition to increased capabilities and reliability, the hardware has been introduced in an evolutionary manner which, in turn, has tended to minimize the organizational chaos and processing disruptions that have so characterized the transitions of installations using some other vendors' hardware. It should be noted, however, that the hardware improvements have not been so much in functionality or philosophy, but in speed, reliability and cost-effectiveness.

And the managers seemed to understand their responsibilities for managing hardware change. One said, "I cannot get set in my ways. I cannot limit my expectations. I must be sensitive to

change and be willing to accept it."

- Most NCR installations have never been particularly enamored of in-house custom system development. So, as good software packages have become available, NCR DP managers have snapped them up. Their philosophy toward package enhance-

ments was succinctly put by one interviewee: "Don't enhance — unless absolutely necessary."

- NCR DP managers, at last, seem to be maturing in their jobs. Some have learned how to deal with their personnel problems through formal education programs and seminars, but the vast major-

ity have learned through osmosis. One interviewee tells his people to make up their minds once and for all as to whether they want to work with people or machines. "And they're making good decisions," he said.

- One problem area seems to be the dependency of most NCR customers on the ven-

dor for technical support. As a result, for example, comprehensive technical training programs are hard to find in NCR computer centers, although increased hardware complexity is forcing at least the larger installations to plan such training. As another example, few

(Continued on Page 60)

The new look in low-cost data entry.

It's the brand new HP 2622 block mode terminal from Hewlett-Packard.

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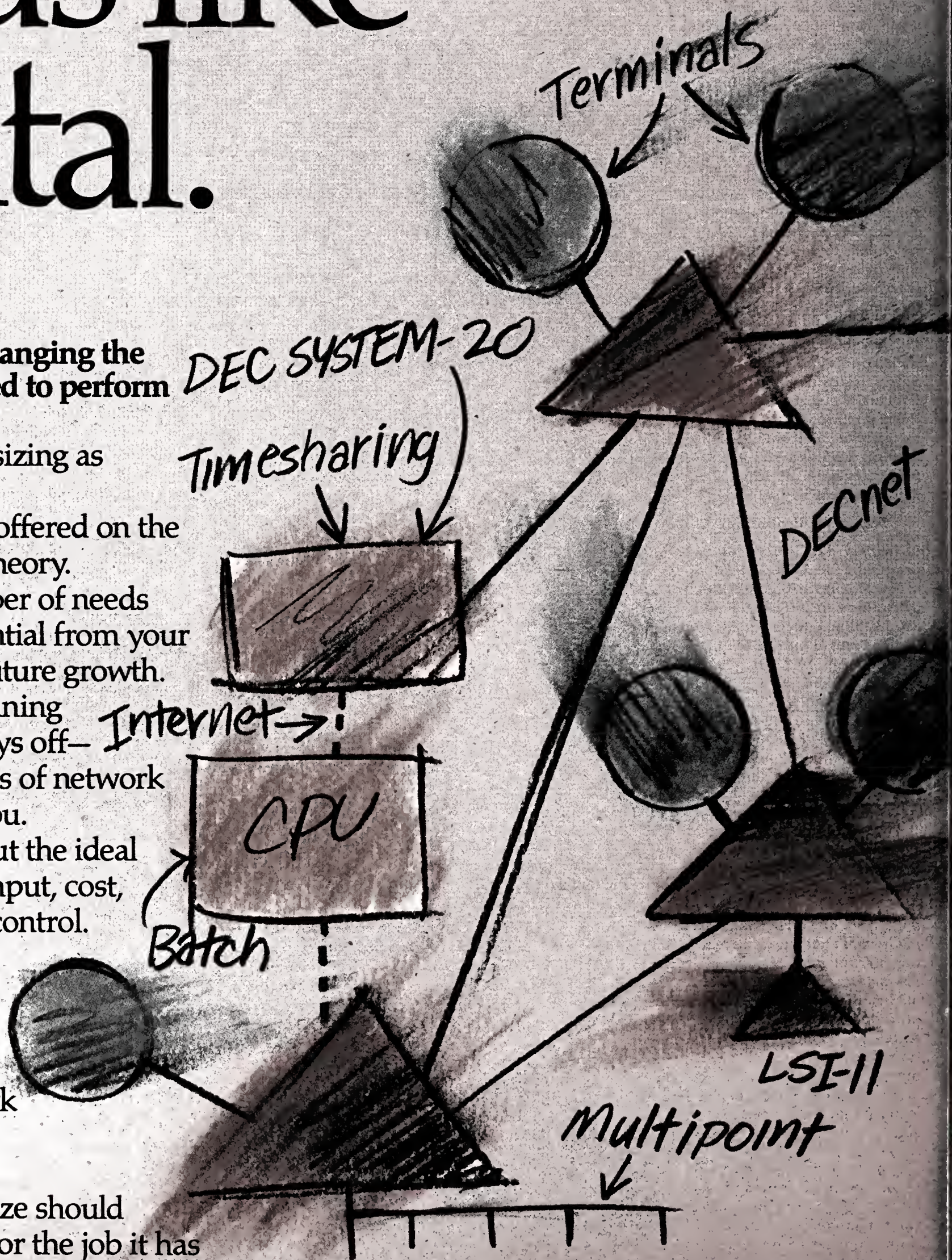
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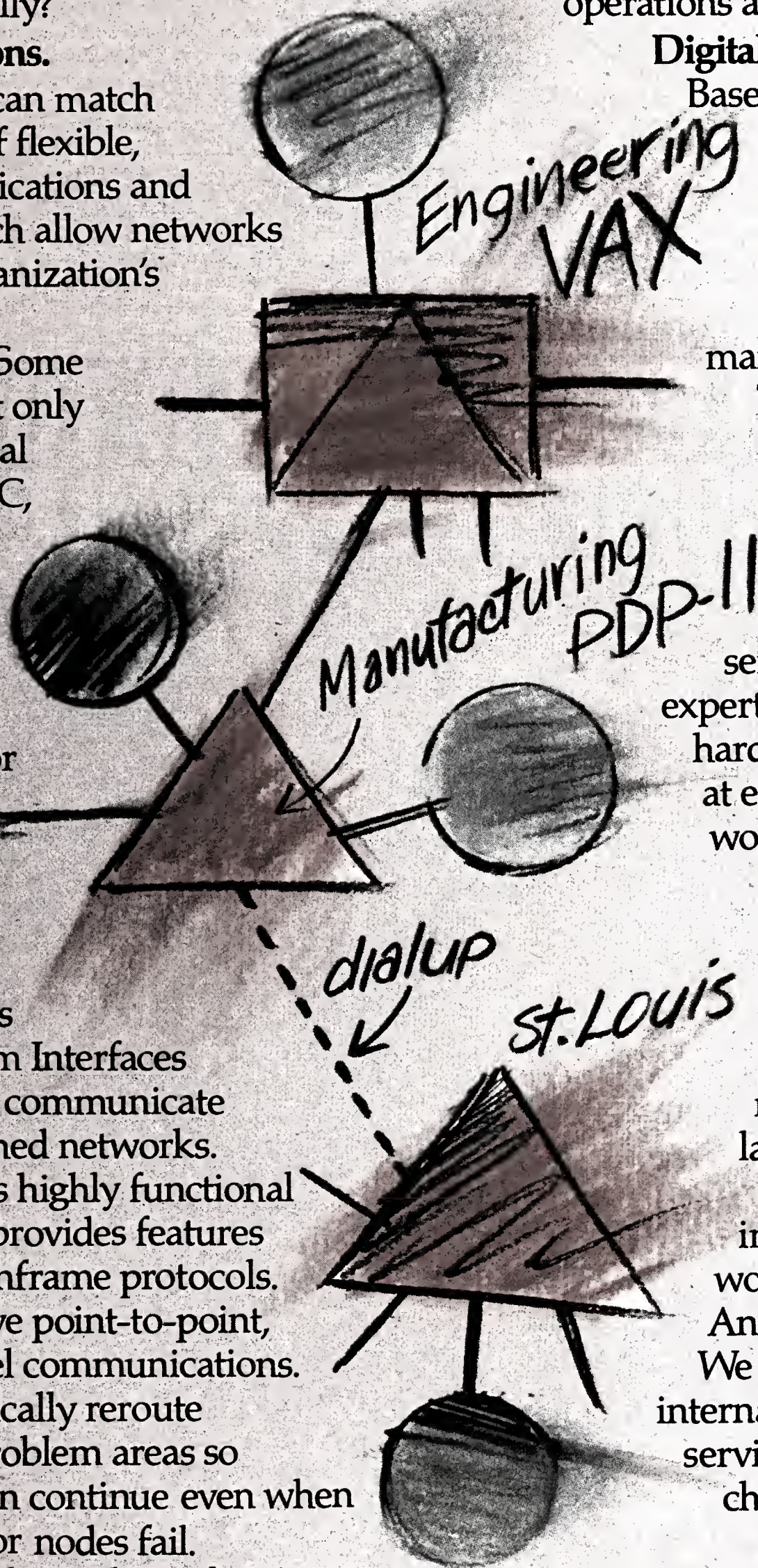
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mention.

I for one stand against the conspiracy to undermine the reputation of quality that IBM continues to attain. Our company is a satisfied customer of IBM! IBM's high standards should be an example for all vendors.

Sheila D. Hartsell
Data Processing Manager
Speizman Industries, Inc.
Charlotte, N.C.

LETTERS

Tips on Squaring

I have two suggestions to speed up John Graney's problem [CW, March 30] of squaring the integers from 1 to 10,000 consecutively:

1. Get rid of the "print" statement. That is not computation.
2. Take advantage of the fact that consecutive squares of integers differ by 1, 3, 5, 7

... and do two additions instead of an exponentiation or multiplication.

David Ames
Watertown, Mass.

... More Advice

John Graney had better learn how to POKE machine language routines into his TRS-80 if he expects it to work faster than the 35-year-

old Eniac.

I'm not familiar with Z80 Assembler instructions, but this is how you can square all integers between one and 10,000 in less than one-third of a second on a Centurion minicomputer (6000 Series):

Direct	CLA	Clear register A.
A1	EQU	Set up loop address.
	INA	Increment register.
	XAY	Copy to reg. Y.
	MUL A,Y	Multiply and store in XY pair.
	SUB/ LIMIT,	A,B Find difference between limit and counter.
	BNZ A1	Loop back if there is one.

The field, "LIMIT," has been defined earlier as 10,000.

Oscar Kirzner
Dallas, Texas

NCR Users Confident

(Continued from Page 57)

centers have in-house systems programmers, but this situation is changing for the same reason:

Stable Workforce

- The interviewees generally felt that their own installations are blessed with a stable workforce and believe that, surprisingly, many others have low turnover rates. They gave considerable indirect credit to NCR for this in that they stated that NCR hardware/software configurations are relatively easy to install, easy to operate and, with upward compatibility, easy to convert. As a result, DP managers are able to turn their attention away from system installation and reliability toward personnel and management.

- The interviewees felt good about their relationships with top executives. As one said it, "They don't really understand what we're doing, but they have faith — and our successes have justified their faith."

- There seemed to be real feelings of pride in their accomplishments for their users. One expressed it this way: "Fifteen years ago we gave our users a foot-high stack of paper and told them: 'Your answer is somewhere in there.' Today, we work together, with a mutual appreciation for each other's problems."

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Free: Relational DBMS Used for Space Shuttle

By Lois Paul
CW Staff

U.S. companies can obtain — free of charge — the software that was used successfully by the National Aeronautics and Space Administration (Nasa) to track 600K words of data for the April space shuttle launch.

Relational Information Management (RIM), the relational data base management system used by Nasa, and other prototype data management software are the results of a government research and development effort to create software for engineering and manufacturing applications.

The software may be re-

quested from the Integrated Programs for Aerospace-Vehicle Design (Ipad) Project Office, Nasa Langley Research Center, Hampton, Va. 23665.

RIM Development

The development of RIM and other software products is being done through a prime government contract with Boeing Commercial Airplane Co. in Seattle, Wash., and subcontracts with a variety of smaller firms.

The \$4 million/year price tag of the R&D effort comes out of Nasa's Office of Aeronautics and Space Technology. All of the products coming out of the Ipad program

(Continued on Page 64)

Set of Utilities Handles Cobol Upkeep on 360, 370s

BETHESDA, Md. — A set of stand-alone utilities designed to facilitate Cobol program maintenance on IBM 360 and 370 and plug-compatible equipment under any operating system was developed here by Sage Software Products, Inc.

Called the Maintenance Programming System (MPS), the set includes a program reformat utility and a file compare facility that reportedly makes "before-and-after" comparisons of any two machine-readable input files.

An automatic dictionary development system is said to scan the source code and create a systemwide alphabetically organized dictionary of data names, aliases and usages.

MPS also includes a program logic flow analyzer designed to highlight "dead code" and suspect logic construction and a program cross-reference facility that reportedly references procedure division statements to data definitions and vice versa.

A source portability analyzer that is said to pinpoint specific coding syntax that is not generally portable across machine and operating system bound-

aries also is included.

MPS is available with user and installation documentation and the release tape for less than \$10,000 from Sage at Dept. MPS-7, 5161 River Road, Bethesda, Md. 20016.

Dictionary Backs Data Base Design

BEDFORD, Mass. — A design dictionary, the first phase of Facets, a data base design package for IBM and plug-compatible equipment, was developed here jointly by Synergetics Corp. and Performance Development Corp. (PDC). Facets reportedly combines concepts of Synergetics' Data Catalogue 2 data dictionary and PDC's data base planning strategies.

Facets' Design Dictionary is said to assist in the planning, determination of requirements and design stages of a data base system design project.

During planning, Facets models a company's organizational structure and aids in the development of a matrix that maps information to the functions or business activities performed, the vendors said. A matrix gen-

DBMS-TP Combo Helps Flint, Mich., Go On-Line To Tax, Utility Accounts

By Robert Knox
Special to CW

FLINT, Mich. — A software package recently installed here is giving city workers on-line access to the status of tax and utility accounts.

The Treasury Collections and Accounts Receivable System (Tcars) combines Concom Systems, Inc.'s Total data base management system and -TP, a teleprocessing monitor from Moore Data Systems, Inc., to run on the city's NCR Corp. 8575-M CPU under the VRX operating system. Tcars makes use of a unique on-line recovery/restart methodology to support real-time update capabilities.

The system has been designed to maintain accounts receivable information on the many different types of accounts due the city. On-line inquiry and update are allowed from about 25 Applied Digital Data Systems Inc.'s (Addis) 980-asynchronous CRT terminals located in the Treasury, Finance, Assessment, and Water offices.

In addition, amounts received are entered and validated on-line through three NCR 275 fi-

nancial terminals located in the Treasury Division.

Most payments received through the mail are receipted through three additional NCR 275s running off-line in a back-room operation. These terminals capture data on tape cassettes which are entered into the system at night.

Billing System Interface

Tcars is interfaced to the city's on-line utility billing system to receive new billing and sales information and maintain the receivable on amounts due for water and sewer services.

Payments and other amounts credited are handled through Tcars and the balance accessed by the water system to print arrearages and total due on customer statements.

The assessor's staff uses Tcars' on-line capabilities to maintain the assessed valuation on all real and personal property within the city. The assessor is also charged with maintaining deed holder information and property descriptions on almost 70,000 parcels valued at \$1.7

(Continued on Page 62)

erator option is under development to automate this process.

To determine requirements, Facets reportedly helps locate the services or functions where

information is accessed and stored. Further analysis yields the local views or data types needed to perform the function.

(Continued on Page 63)

'Oracle' DBMS Update Adds Report Writer, Query Feature

MENLO PARK, Calif. — Relational Software, Inc. (RSI) announced the release of Version 2.3 of its Oracle relational data base management system (DBMS). The update can be used on Digital Equipment Corp. VAX-11 systems under VMS and DEC PDP-11 systems under the RSX-11M, IAS, RSTS and Unix operating systems.

The Oracle report writer was formally released with Version

2.3, the vendor said. It reportedly can be used to produce disjoint reports and nested reports and also allows formatted data from the data base to be interleaved with formatted text within a single report.

The vendor said Oracle's interactive query facility has been enhanced to enable users to produce reports that result from queries against the data base.

(Continued on Page 64)

PSAM SCORES AGAIN!

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These are the results of a recent benchmark of PSAM, the alternative access method for ISAM and VSAM. Even though PSAM won't improve every job's performance by this much, it usually reduces ISAM/VSAM processing time by an astounding 30% - 50% overall! In addition, it reduces file reorganization frequency, reduces disk requirements, improves T.P. response time and runs native mode on 3330 II and 3350 disk drives. The most important feature of PSAM is its high degree of transparency.

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You can convert a file to PSAM in minutes. And if you're facing a

conversion to VSAM, note that PSAM also runs on DOS/VSE. It can help you avoid VSAM altogether or let you convert to VSAM at your pace, not IBM's. Try PSAM free of charge. You'll

be surprised by its performance, and how easy it is to install and use. For a free test copy or more information, send in the coupon or call us toll free.

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DBMS-TP Combo Helps Flint Go On-Line

(Continued from Page 61)
billion.

The Finance Department uses the system to enter bills for amounts due the city for such varied items as city property damaged in traffic accidents or rent due on city-owned property.

In addition, it enters the account distribution codes used by Tears to automatically distribute revenue and receivables to the municipal fi-

nance system.

Treasury Division employees use the system to receipt and validate payments, research taxpayers' questions about the status of their accounts, and to request the running of update and balancing reports following the nightly posting run.

Heart of System

The heart of the system is the .23-file Total data base

containing over two million active records stored on two NCR 658 EDA disk drives.

Organized into nine master files and 14 variable entry files, the data base allows access to 150,000 accounts by account number or street address and provides cross-reference capabilities between different types of accounts.

It also contains comprehensive statistical information and security codes, which al-

low the treasurer to restrict access and monitor utilization by operator, function and device.

System Makeup

Developed for the city by Moore Data Systems, Inc. of Baton Rouge, La., the system consists of almost 150 programs and on-line modules, virtually all written in Cobol using structured techniques for ease of maintenance.

To support the on-line, real-time update capability, Moore analysts developed a special logging/recovery module called via the Total user-logging exit.

This module records the before and after images of the data base records being accessed during the current transaction.

Should the system go down, it would automatically restore the data base to its condition prior to the transaction in process when it comes back up.

Up and Running

The system was in place in time for first-installment tax billing in late spring of this year.

The system is normally on-line for nine to 10 hours each day and handles about 8,000 transactions in an average day. Volume of financial transactions varies greatly day-to-day, but averages 4,000 to 4,500.

As with any newly installed system, problems have been encountered. In addition to the usual minor programming errors, there was also a need to make and then reverse a major revision to the system because of conflict over a change in the city's tax billing methodology.

Operation Times

Terminal response time has been adequate. Nightly batch run times have been trimmed to about 1½ hours.

"Some periodic high-volume runs, like tax billing or monthly penalty update, are killing us on the days when they have to run," DP Administrator Chuck Samuel said.

"We are working on tuning the system to reduce these excessive run times."

The structured code has helped the DP staff keep up with requests for changes and improvements. Now they are working on development of a separate test data base to make program checkout easier and allow more regression testing to determine if changes have deleterious side effects.

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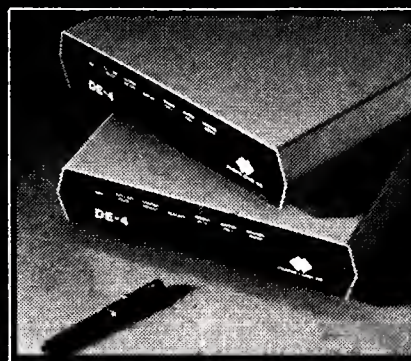
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'Quick-Index' Builds Vsam Indexes

CLINTON, Md. — Softworks, Inc. has announced a utility called Vsam Quick-Index to build Vsam alternate indexes. The utility sorts and loads alternate indexes, does not require a Vsam data space for sorts and makes only one pass of the base cluster even if multiple indexes are being built, the vendor said.

Vsam Quick-Index is said to allow the user to build sparse indexes, which means that user-specified key values such as blanks and zeroes are not included in the index. It also allows the user to build indexes from multiple, noncontiguous fields in the base record, according to Softworks.

The utility operates under IBM OS/VS and DOS/VS/VSE operating systems. Vsam Quick-Index costs \$3,000 for OS/VS users and \$2,600 for DOS/VS/VSE users, the vendor said from 8023 Malcolm Road, Clinton, Md. 20735.

Dictionary Backs Design

(Continued from Page 61)

tions and indicates the structures in the views that are accessed, the vendors said.

During design, local views are consolidated into a logical data base architecture by either manual inspection or, eventually, by using an optional relational generator that is being developed.

Once families and hierarchical dependencies are located, the resulting logical architecture is fine tuned to satisfy constraints and discover logical files and access keys, the vendors said.

A frequency analyzer option will be added to Facets to automate this fine tuning. The final result of the design phase is reportedly a logical data base architecture that is independent of any specific data base management system (DBMS).

The vendors explained that this can serve as a foundation for final implementation of the data base, no matter what type of DBMS is used.

The Facets Design Dictionary currently is available and sells for \$15,000. The matrix generator, relational generator and frequency analyzer options will be made available at a later date, the vendor said from Suite 110, 5060 N. 19th Ave., Phoenix, Ariz. 85015.

'Portia' Designed For Time and Billing

OAKLAND, Calif. — Portia, a time and billing package designed to be used by professional offices such as law firms, is available from Herring Associates, Inc.

Applications include time and billing, calendar, accounts receivable, general ledger and accounts payable, the vendor said.

Portia costs \$20,000 and includes 80 hours of on-site time for installation and customizing. The firm is located at Suite 3, 383 Grand Ave., Oakland, Calif. 94610.

Functions in Nontextual Environment

IBM Updates 'Stairs' for Batch Orientation

WHITE PLAINS, N.Y. — The capabilities of IBM's on-line Storage and Information Retrieval System (Stairs) now are available for batch-oriented data.

Stairs/VS Multiple Inverted Key Environment (Stairs/VS-Mike) is an addition to Stairs/VS that functions in a nontextual or mixed textual/nontextual environment. It reportedly brings Stairs/VS on-line inquiry facilities to data other than that stored in a Stairs/VS data base, such as data in application areas that previously were batch oriented.

With Stairs/VS-Mike, the user does not need to convert existing data files to a specific Stairs/VS data base, and data for new applications does

not have to be formatted in a Stairs/VS specific format, the vendor said.

The user reportedly can implement an on-line inquiry system with new or existing data in a variety of formats, including DL/1, Vsam or sequential.

Multiple key fields may be identified, indexed or searched with

Stairs/VS-Mike, the vendor said. After a search, the user can browse the data from the selected on-line data base.

The Stairs/VS-Mike package is available for \$500/mo under a one-year lease, the vendor said from 1133 Westchester Ave., White Plains, N.Y. 10604.

'Staad-III0' Fits DEC, Prime, IBM

CHERRY HILL, N.J. — The Structural Analysis and Design (Staad-III0) program, which is said to be very similar to the Strudl program containing complete analysis and design capabilities, can now be installed on Digital Equipment Corp.

VAX-11s, Prime Computer, Inc. and IBM 4331 and 4341 processors.

Available through Research Engineers, the program costs \$10,000.

Research Engineers can be reached through P.O. Box 2706, Cherry Hill, N.J. 08034.

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This system is capable of performing thousands of functions, which we obviously can't list here. It's becoming increasingly popular

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Space Shuttle Software Free for the Asking

(Continued from Page 61)

are public domain software. Because they are being developed through government funding, they are currently being made available to U.S. organizations for testing and evaluation at no charge.

However, Robert E. Fulton, Ipad project manager at the Nasa Langley Research Center, said there may eventually be some kind of user fee.

RIM was used at Langley on Prime Computer, Inc. Model 400 and 750 equipment running under the Primos operating system and on Control Data Corp. Cyber 173 and 175 computers running under the NOS

operating system.

RIM also is available on Digital Equipment Corp. VAX-11 computers running under VMS, according to Don Taylor, Nasa Ipad program support manager at Boeing, where RIM was developed.

First Release

Taylor explained that RIM was first released in 1979. The Fortran-based DBMS is for engineering and business applications, he said, describing it as "a good stand-alone system to manage and query a data base."

RIM has been available for 18 months, but Boeing has not publi-

cized it because it is essentially public domain software, Taylor said. The purpose of the Ipad project was to work on increasing national productivity, not to sell specific vendors' products, he explained.

"The Ipad project will have a significant impact on the direction most companies will go with CAD/CAM [computer-aided design and manufacturing] processing," Taylor said.

About four years ago, as part of the Ipad project, Boeing began evaluating all available DBMS. Taylor said the researchers found them deficient in regard to CAD/CAM-type processing. This led to the development

of RIM.

"The principal Ipad development effort began in 1976," Robert Fulton of the Nasa Langley research center said, noting that there had been studies beginning in 1971 to define computer-related design issues that should be pursued under the Ipad project.

"The purpose of the current development project is to improve technology for managing engineering information to aid the design environment, primarily for the integrated activities involved in building a complex aerospace vehicle," Fulton said.

Software Needed

The project determined the following software systems needed to be developed:

- Data management.
- Executive software (to control distribution of information and data over multiple processors).
- User and system utilities (including geometry and graphics.)

The highest priority, according to Fulton, was to develop prototype data management software for engineering. The interactive relational RIM system resulted from this effort.

Also under development is a prototype of a multischema data management system denoted Ipad Information Processor (Ipip). This is targeted for the management of data with multiple formats, including relational, hierarchical and network.

Designed for use on a network of computers, Ipip's current implementation is on CDC machines running under NOS.

The second phase of the Ipad project will begin the latter part of 1982 and will involve the technique of networking computers.

Fulton noted that many time study analyses indicate that 80% of the time involved in software development is spent rearranging, finding and manipulating known data.

As Fulton explained it, the techniques for managing business data are extremely well developed. A need exists for data management within technical and scientific applications.

'Oracle' Gains Report Writer

(Continued from Page 61)

The interactive application facility is said to be enhanced to allow end users the full range of SQL Query operators while using full-screen transactions. A CRT definition utility has been added to provide support for almost any type of CRT, the vendor added.

A loader utility has been added that reportedly allows an Oracle user to load data from a file into a data base without having to write a program. The utility contains functions for mapping raw data formats into data base table structures, according to RSI.

A perpetual license for Oracle Version 2.3 is available for \$48,000. Lease terms are available for \$2,000/mo, the vendor said from 3000 Sand Hill Road, Menlo Park, Calif.



Performance Improvement through Advanced Technical Education

CompEd, a subsidiary of Spiridellis & Associates, Inc., is the realization of a progressive approach to technical education. We offer a comprehensive selection of LIVE, high level DP instruction utilizing PROFESSIONAL EDUCATORS & FULLY EQUIPPED facilities. These intensive courses are lecture-based and may include "hands-on" use of in-house computers. All courses are supported by a custom-design mix of collateral material.

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• Design, code and debug CICS/VS macro-level application programs • Invoke program, file, terminal and data management services • BMS input/output mapping

CICS/VS Command-level Applications Programming
• Design, code and debug CICS/VS command-level application programs • Invoke program, file, terminal and data management services • BMS input/output mapping

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• Use program dump to diagnose abends • Apply Trace, Dump and EDF facilities • Testing techniques for CICS/VS environment • Program testing and debugging workshop

CICS/VS System Design
• Design systems that utilize CICS/VS facilities effectively • Use program, file, terminal and data management services • Format screens using BMS and 3270 IDS facilities.

DMS/CICS/VS Design and Programming
• Generate on-line applications • Utilize supervisor and system functions • Code calculation, edit, control routines • Apply panel hierarchy techniques

DATA MANAGEMENT

VSAM Coding for Higher Level Languages
• Process VSAM files effectively via COBOL or PL/1 application programs • Load, read, update and extend key or entry-sequenced datasets • Use alternate index to process VSAM file

VSAM Using Access Method Services (AMS)
• Design and implement VSAM file structures • Use AMS commands to manage VSAM catalogs, data space, datasets • Create and use alternate indexes • VSAM recovery procedures

DATA BASE TECHNOLOGY

IMS/VS Applications Programming DB
• Logical/Physical data base structures • Code DL/I calls to retrieve, update, add or delete segments • Build segment search arguments • Process status codes • Establish data base position

IMS/VS Applications Programming DC
• Describe IMS/VS message flow • Code DL/I calls to send and receive single or segmented messages • Design and code conversational programs • Use batch message processing facility

IMS/VS On-line Message Formatting (MFS)
• Create and use device formats • Create and use message input/output-descriptors • Format screens using MFS and 3270 IDS facilities • Compile MFS source statements

PROGRAM & SYSTEM DEVELOPMENT

TSO Command Language
• Use TSO commands to compile, execute, test and debug programs • Create, edit and manage datasets • Process jobs in background mode • Prepare and execute CLIST's

CMS Conversational Monitor System
• Use CMS commands to compile, execute and debug programs • Create/modify datasets via EDIT facility • Transmit and receive spooled datasets • Prepare and run EXEC procedures

STRUCTURED Analysis and Design
• Prepare feasibility study and system proposal • Develop system specifications • Implement top-down design and testing procedures • Use structured walkthroughs

ON-LINE Systems Design
• Define on-line system requirements • Develop specifications and controls • Describe screen design procedures • Manage on-line files/data bases • Describe communication network components

NEW COURSES

DATA BASE DESIGN Principles and Procedures
• Analyze data requirements • Describe logical data base design procedures • Define hierarchical, network, inverted file and relational DB structures

OS/VS JCL Advanced Features
• Prepare, update and execute catalogued procedures • Modify and pass parameters • Code job restart procedures • Utilize installation resources • Create and manage datasets

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New 'Disspla' Version Boasts Blanking Feature

CHICAGO — A new version of Disspla, the device-independent graphics software system that calls on a library of more than 700 Fortran subroutines to produce graphics applications is being offered by Integrated Software Systems Corp.

Designed for the mainframe and minicomputer environment, Disspla operates on a number of IBM, Sperry Univac, Control Data Corp., Digital Equipment Corp., Honeywell, Inc. and Burroughs Corp. computers and interfaces with plotters, graphics terminals, computer outfit microfilm units and other graphics output devices from more than 20 vendors, according to the firm.

Major Enhancements

The major enhancements include a blanking system that helps eliminate confusing and overlapping lines, curves or annotation on high-quality charts and graphs.

Other new features include

Qtech Offers Graphics Library For VAX-11s

OLD LYME, Conn. — Qtech Associates here introduced a device-independent graphics library for Digital Equipment Corp. VAX-11 systems.

Qplot includes routines for two-dimensional rectangular and polar plotting, three-dimensional rectangular plotting with hidden line removal, flow charting, mapping and typesetting.

An intermediate plot file may be generated with subsequent redirection to specific devices via a postprocessor, the vendor said.

Qplot is said to currently support plotters and graphics terminals from Tektronix, Inc., California Computer Products, Inc., Versatec, Inc., Chromatics, Inc., Digital Engineering, Inc., Selanar Corp. and Digital Equipment Corp.

Qplot is priced at \$3,000. Qtech can be reached through P.O. Box 952, 4 Jean Drive, Old Lyme, Conn. 06371.

IBM 5120 to System/34

Basic Conversion program

Creates System/34 Basic language source code from IBM 5120 Basic Source.

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San Diego, CA 92121

714/455-6235

improved character generation and type selection for annotation and other text portions of graphics presentations, a new virtual storage system that reduces memory requirements and extended mapping capabilities.

Disspla, which has a base price of \$214,500, is available from the firm at 4186 Sorrento Valley Blvd., G, San Diego, Calif. 92121.

'IFM,' 'Inform' Get Graphics

KANSAS CITY, Mo. — United Computing Systems, Inc. has added a graphics application called Unigraf for users of its IFM and Inform data management systems.

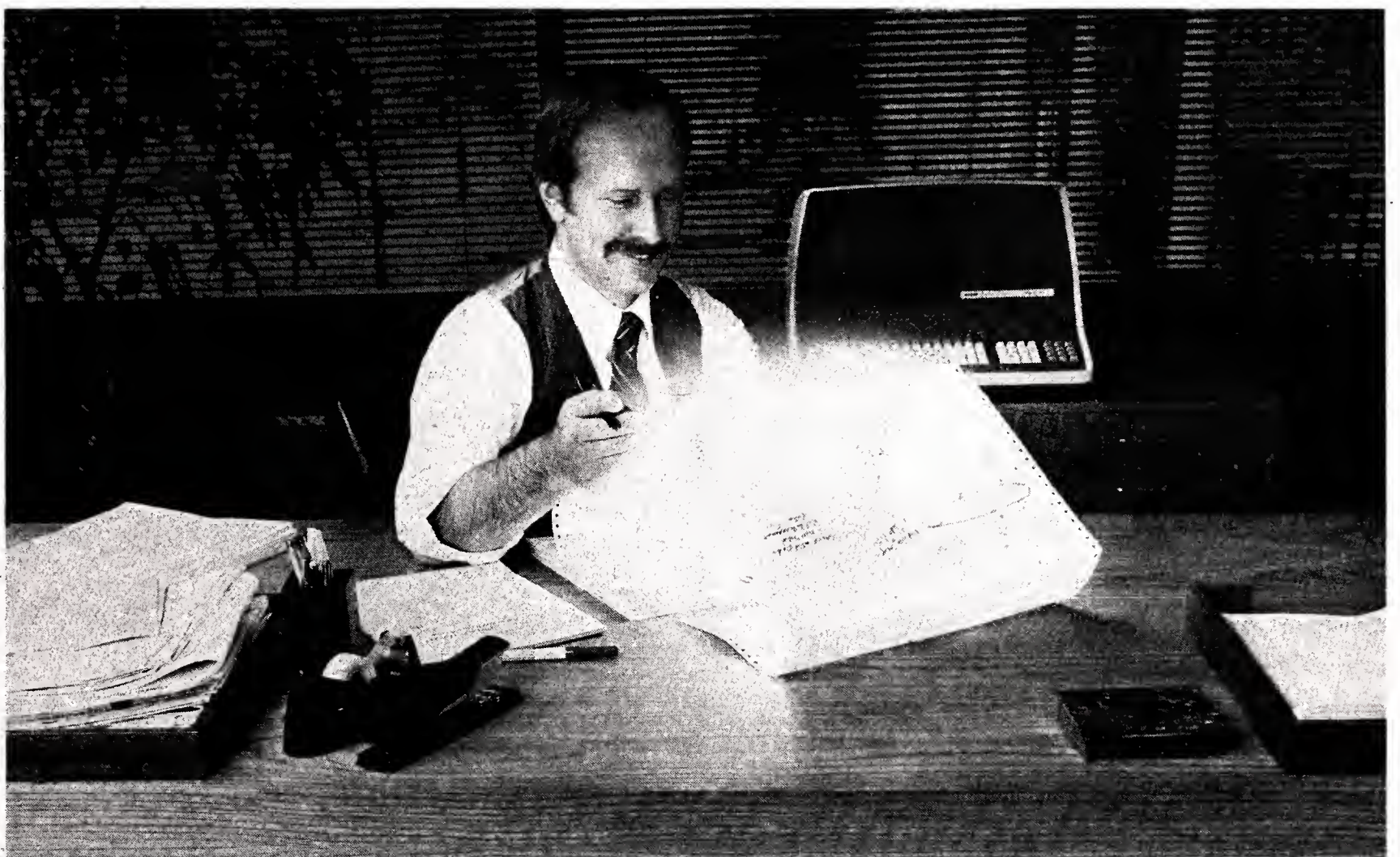
Unigraf reportedly is designed to process data files into graphics applications. It can draw line, bar or pie charts with multicolor or bold shading patterns, the vendor said.

Multiple plots may be positioned on one page, and multiple sets of data may be placed on one plot, according to United Computing. Each data set is said to contain

as many as 500 points.

Unigraf features include automatic scaling or positioning of data annotation, support of linear, logarithmic and semilogarithmic axis systems, selection of suitable axis parameters to include specified data, a variety of axis labeling methods and device independence, according to the vendor.

Unigraf is available based on the service unit pricing for IFM and Inform, United Computing said. The firm may be reached through P.O. Box 8551, Kansas City, Mo. 64114.



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MCS Offers 'Anvil' Pair Aimed at CAD/CAM Users

SANTA ANA, Calif. — Two computer-aided design and computer-aided manufacturing (CAD/CAM) software packages were introduced here by Manufacturing and Consulting Services, Inc. (MCS).

The Anvil-4000L CAD/CAM software package for 24- to 64-bit systems is said to extend MCS' AD-2000 package. All AD-2000 users currently under maintenance contract with the vendor will receive the new software in June, the vendor said.

The Anvil-4000S CAD/CAM package was announced for 16-bit architecture hardware.

Range of Enhancements

Enhancements included in both packages are an interactive tablet configurator; user-controlled drafting standards; multiple-view layouts and precision; local and universal coordinate systems; 3-D drafting and manipulation; shared or individual work files; finite element meshing; isometrics and true perspectives; and initial graphics exchange specifica-

tion.

Anvil-4000L costs \$95,000 and, under this package, a Basic Geometry module costs \$31,000; Extended Geometry is priced at \$28,000; Drafting costs \$15,000; Numerical Control is available for \$26,000; and Analysis is priced at \$7,000.

Under the Anvil-4000S package, a Basic Geometry module is priced at \$27,000; Extended Geometry, \$24,000; Drafting, \$14,000; Numerical Control, \$25,000; and Analysis, \$7,000. The total Anvil-4000S package is available for \$80,000.

The vendor is located at 2960 S. Daimler Ave., Santa Ana, Calif. 92705.

Wisner Adds 'Cashmax' Update

LOS ANGELES — Wisner Associates, Inc. has added a debt management and reporting software module to Cashmax, its investment management system.

The debt management module is transaction-oriented, and submodels handle the credit facilities of revolving credit lines, commercial paper, corporate bonds, term loans, preferred stock and letters of credit.

Cashmax operates over a nationwide time-sharing network. The system costs \$500/mo to \$85,000 for a one-time charge, Wisner said from 22134 Sherman Way, Canoga Park, Calif. 91303.

Package Aids Funds Transfer

LEXINGTON, Mass. — A funds transfer and position control system for IBM 4300, 370 and 3033 hardware, designed for a money center or regional banks, has been announced by TMI Systems Corp.

Transfer provides automated interfaces to the major banking funds transfer networks and has a remote processing capability, allowing two or more departments in different locations to share the same funds transfer system, the company said.

Transfer's price ranges between \$100,000 and \$250,000 depending on options and wire services and is available from TMI Systems Corp., 83 Hartwell Ave., Lexington, Mass. 02173.

System Handles Inventory Work

DENVER — Gathers Software, Inc., a data processing service company, has announced an Inventory Control/Distribution System.

The package uses a portable data entry terminal for recording sales. Hand-held devices allow salespersons in remote or customer locations to enter inventory information directly into a company's computer system, eliminating the need for key-punchers.

The package's on-line, interactive, data base software also provides order entry, inventory control, sales analysis, general ledger, payroll, accounts receivable and payable and invoicing credits, the vendor said.

The Inventory Control/Distribution System costs \$21,500, the vendor said from 3888 E. 45 Ave., Denver, Colo. 80216.

Utility Manager Runs on HP Gear

IRVINE, Calif. — Public Agency Data Systems, Inc. has introduced a utility management system program (UMS 81) for public and private agencies that operate water systems and/or trash collection systems and use Hewlett-Packard Co. equipment.

Meter and customer information is updated on-line and can be retrieved at any time. Instantaneous retrieval is possible by account number, customer name or service location. Payments are entered with batch and daily controls and hard-copy logs. Payments and charges create journal entries that update the financial data base. Normal calculations and billing include regular billings, closing bills, delinquent bills, final notices and delinquent closing bills.

Written in Cobol, the program costs \$8,000. More information is available from the firm at Suite 31D, 17941 Sky Park Circle, Irvine, Calif. 92707.



THE ASCII TERMINAL QUALITY YOU CAN SEE FOR

KDSS Key-to-Disk Subsystem Updated for DEC Users

LEXINGTON, Mass. — Evans, Griffiths and Hart, Inc. announced here the release of Version 4 of KDSS, a key-to-disk data entry subsystem for the Digital Equipment Corp. PDP-11 system, running under either RSTS/E Version 7.0 or RSX-11M Version 3.2 operating systems.

The performance-critical parts of the data entry process are written in Macro-11 as reentrant shared code, implemented as a run-time system under RSTS/E and as a shared library under RSX-11M, the vendor said.

Data entry reportedly may take place at multiple terminals, run-

ning under the control of one task or job.

KDSS Version 4 includes support for 20 different terminal types, including the DEC VT100 (Ansi mode); conditional input for fields, either from the keyboard or from a data storage area; increased flexibility for communicating with other jobs or tasks; and facilities enabling interactive creation of screen formats, according to the firm's spokesman.

KDSS Version 4 is available for \$9,000 for a single CPU license from Evans, Griffiths and Hart, Inc., at 55 Waltham St., Lexington, Mass. 02173.

VAX Users With VMS Get Disk Handler Package

TUSTIN, Calif. — A software disk handler was developed here by the Western Peripherals Division of Wespertec, Inc. for users of Digital Equipment Corp. VAX-11 equipment running under the VMS operating system.

The DCDriver, as it is called, reportedly enables a DEC VAX user with VMS to put a large SMD disk system on its VAX-11/780 or 11/750 unibus and operate it as a systems device.

It is available in two versions for the Western Peripherals DS-231 disk subsystems. It will support either one or two subsystems on the same unibus, the vendor said.

Each subsystem can have from one

to four drives, ranging in capacity from 80M- to 300M bytes, allowing up to 2,400M bytes of capacity.

Version I of the DCDriver reportedly allows the DS-231 subsystem to be used as the system device, the vendor said. All operating system functions, including error logging, on-line DSC and console boot are said to be fully supported.

Version II is a less comprehensive package, according to the vendor, and was designed to allow the user to install a DS-231 system on his unibus as a user device.

Both reportedly include routines for pack formatting, data integrity, testing and subsystem exercising.

The DCDriver license for Version I is \$2,500, while Version II goes for \$1,500, the vendor said from 14321 Myford Road, Tustin, Calif. 92680.

Use with an IBM or non-IBM computer

Our IBM 3101 is a simple-to-use, versatile ASCII terminal that can be attached to most business computer systems—IBM or non-IBM—or used to access many remote computing and time-sharing services.

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nental USA, call 800-431-2670. In New York, call 800-942-1918. In Alaska, Hawaii and Puerto Rico, call collect 914-696-6840. You'll talk to a specialist who can take your order or answer your detailed questions. Delivery of the 3101 can be as soon as 45 days.

Out of the carton and into operation

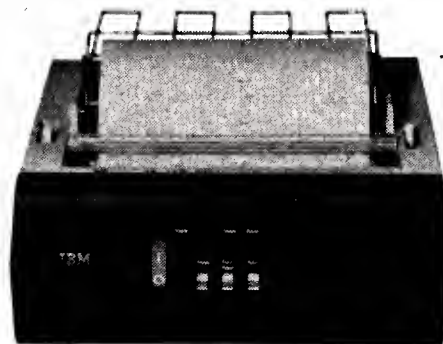
When the 3101 arrives, you simply connect three modular elements—the display, the logic element and the keyboard—plug it in, position the setup switches and put it into operation. It takes just a few minutes. Accessible setup switches in the keyboard let you select functions such as line speed, parity, scroll and reverse video. The 3101 weighs 38 pounds so you can move it easily.



Human engineering inside and out

The 12-inch diagonal screen can be swiveled and tilted to cut interference from overhead lighting. It dis-

plays a maximum of 1,920 characters in 24 lines. You can see and feel the quality, from its comfortable, solid keyboard to its crisp, easy-to-read display.



A low-cost printer, too

You can couple our 3102 printer to the 3101. You'll have the double convenience of displaying all your information, while capturing a hard copy of the data being displayed. The 3102 printer is lightweight and priced at just \$1,295, and is also available for a 15-day trial.

Selected specifications and prices

There are two 3101 configurations: character transmission and block transmission. Character transmission lets you use it like a teletypewriter. Block transmission provides sophisticated editing capabilities, such as insert/delete and full cursor control, along with field functions like blinking, high intensity and protected fields.

The prices for the display terminal start at \$1,295 for the character transmission model, and \$1,495 for the block model. Volume procurements can save you up to twenty percent for either configuration of the terminal. Prices and current schedules subject to change.

Playback Tool Out for PDP-11

BEDFORD, Mass. — Clyde Digital Systems, Inc. has introduced a session playback package for Digital Equipment Corp.'s PDP-11 systems running under the RSTS/E operating system.

Image runs against session documenting log files produced by the firm's DOC program. The VT 100 CRT terminal exchanges a number of control codes with the processor when used in screen formatting applications, according to the firm.

Using DOC to create a log file of a complete session of any given interactive application, together with Image, to replay the session back to the screen, provides dynamic user documentation of screen formatting applications for accurate playback as needed, the firm claimed.

The dynamic application run example can be played back one frame at a time, and a mapping of the dynamic session can be put out as a printed document, the spokesman said.

Available on 800- or 1,600 bit/in., nine-track magnetic tape, Image costs \$295 from Clyde Digital Systems, Inc., P.O. Box 348, Bedford, Mass. 01730.

Pascal Accounting Updated for PDP-11

GLENDALE, Calif. — Theta Business Systems here has developed an RSX version of its Pascal accounting systems for Digital Equipment Corp. the PDP-11/23 and PDP-11/24.

The accounting systems include accounts receivable, accounts payable, general ledger, order entry with billing, inventory control, sales analysis and the Pascal development system. They run within the 128K-byte minimum under RSX and use the Oregon Software Pascal compiler.

The systems are interactive, menu-driven and automatically interface with general ledger. They are highly parameterized, the vendor said.

The list price is \$2,000 per system for RSX and \$1,500 per system for RT-11. A TSX-Plus version also is available from Suite 106, 1110 Sonora Ave., Glendale, Calif. 91201.

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Runs With 'Wordwright' 'Reportwright' Targets Managers

COSTA MESA, Calif. — California Systems Associates (CSA) announced a report generator package called Reportwright. Designed for use by middle- and upper-level managers,

Utility Lets DEC Users Dial Second CPU

BEDFORD, Mass. — Calout, a utility that reportedly enables Digital Equipment Corp. users to dial up another computer from a terminal connected to their own host system was announced here by Clyde Digital Systems, Inc.

A user running Calout from a terminal can dial up another computer by entering the phone number at the keyboard, then work as a remote user of the other computer with the additional ability of moving files from one system to another, Clyde claimed.

Disk files reportedly can be moved between the computers in either direction, including binary program files.

The package will work with any acoustically coupled modem and bit/sec rate, the vendor said, adding that a special modem is available that automates the communications link. Sold as an option with the package, this modem runs at 300- or 1,200 bit/sec.

Calout also may be used with a TWX or Telex system, according to the vendor.

The Calout package is implemented on DEC systems running under RSTS/E and VMS-11 operating systems. It costs \$895 and is available for immediate delivery, the vendor said. More information is available through P.O. Box 348, Bedford, Mass. 01730.

Reportwright reportedly draws information from a variety of data bases, including Minicomputer Business Applications, Inc.'s MCBA software packages.

Reportwright is also compatible with CSA's Wordwright word processing package.

Reportwright was designed for use on equipment running under Digital Equip-

ment Corp.'s RT11 and S&H Computer Systems, Inc.'s TSX and TSX Plus operating systems. It includes documentation, examples, sample data bases and software on floppy disks, the vendor said.

Reportwright is available for \$500 from CSA at Suite Four, 22845 Mesa Verde Drive E., Costa Mesa, Calif. 92626.

'Quick' Helps Programmers Customize Screen Formats

WALNUT CREEK, Calif. — A data entry, inquiry and file maintenance package said to allow programmers to create customized terminal screen formats faster than by using usual programming methods has been announced by Quasar Systems, Ltd.

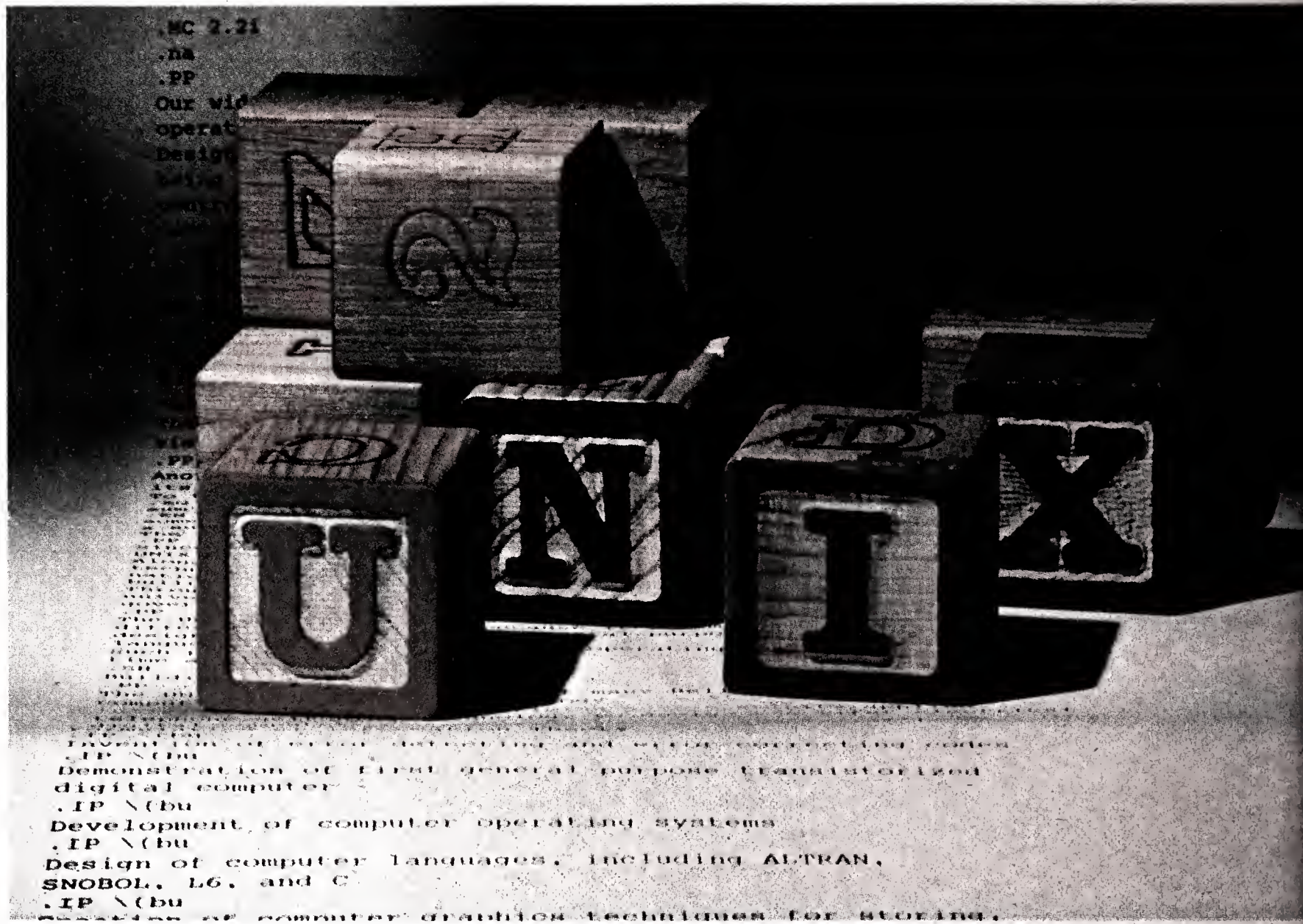
Quick was designed to enhance the efficiency of computer system building in the development of business ap-

plications, creation of data validation and updating of procedures, the vendor said.

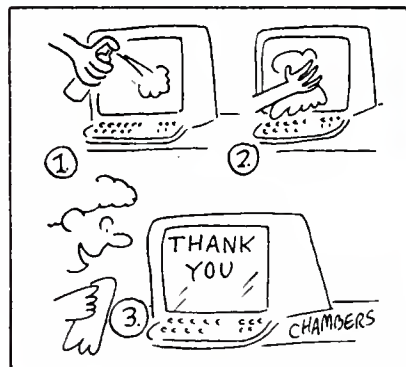
It was designed also as a companion for the company's Quiz report writer sold for the Hewlett-Packard Co. HP3000, the vendor said.

Quick is priced at \$10,000 from Quasar Systems, Ltd., Suite 830, 1990 N. California Blvd., Walnut Creek, Calif. 94596.

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The computer printout in the picture above contains the instructions and input needed for the UNIX system to format and produce the text on the opposite page.



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Nixdorf 600 Users Offered Financial Packages

WALTHAM, Mass. — General ledger, payroll and accounts payable application packages were announced here by Nixdorf Computer Corp. for use with its 600/35, 600/45 and 600/55 systems running under the DPEX operating system.

Nixdorf is also offering a Programming Utility package for DPEX users.

The application packages reportedly can be integrated

into existing systems or installed as special-purpose applications on new 600 series systems. The general ledger package includes a report generating capability designed to provide a set of financial statements on the company's financial position, including current month, year-to-date and budget figures and previous year comparative numbers.

The package is said to han-

dle general ledger functions for a single corporation, a company with multiple divisions or a company consisting of a number of corporate groups. It accommodates up to 1,000 profit centers, statements for which can be incorporated into statements at several corporate levels.

Parameterized System

The accounts payable package categorizes input infor-

mation into invoices, pre-paid invoices, debit and credit memos, adjustments to existing invoices and manual or hand payments. This package includes a parameterized system for check disbursement control, the firm said.

The Nixdorf payroll system is a modular-designed system that carries out general payroll functions and includes special reports and

listings, such as employee phone directories, the vendor said. It can interface with the general ledger system, posting wages, taxes and deductions by profit centers or departments.

The general ledger, accounts payable and payroll packages are available for a one-time license fee of approximately \$2,000 to \$2,500 each, which includes documentation, the vendor said from 168 Middlesex Tnpk., Burlington, Mass. 01803.

Pritsker Adds Four Packages For Simulation

WEST LAFAYETTE, Ind. — Four simulation software tools called Slam II, Simchart, Aid and SDL were announced here by Pritsker & Associates, Inc.

Slam II is a simulation language that reportedly supports three modeling viewpoints in a single, integrated framework. Simchart is an interactive graphics software tool for producing visual displays of simulation output, the vendor said.

Aid is an interactive graphics approach designed for fitting probability distributions to observed data. SDL is a data base management system designed for use with simulation projects, according to Pritsker & Associates.

Each tool can be leased the first year for between \$5,000 and \$7,000, which includes installation and maintenance. Leasing in subsequent years ranges from \$750 to \$1,250 each, the vendor said, through P.O. Box 2413, West Lafayette, Ind. 47906.

System Aids Truck Routing

DEDHAM, Mass. — Logistics Systems, Inc. has announced Compu.Map, a truck mileage and routing system for General Electric Co.'s national time-sharing network.

Compu.Map can be accessed via the GE network or purchased directly from the vendor. It costs between \$300 and \$55,000 from 990 Washington St., Dedham, Mass. 02026.

Our widely accepted **UNIX™** operating system is simplifying the use of computers. Designed to handle a variety of applications, it is being used to manage and maintain the telecommunications network, control experiments, develop software, process text, prepare documents, and teach computer science.

The **UNIX** system allows users to take small programs and assemble them like building blocks to perform complex tasks. In text processing, for example, the command "Spell Bell Labs Ad" tells a computer to proofread this ad against a dictionary filed in its memory. The program that performs the task was created by simply combining several smaller **UNIX** programs.

Another useful feature of our **UNIX** operating system is its ease in typesetting mathematical expressions. To typeset an equation like

$$\sum_{i=1}^{\infty} \frac{1}{x_i} = \pi$$

someone need only type: "Sum from i=1 to infinity 1 over x sub i = pi." The computer does everything else.

Since 1969 the Bell System has installed more than 1100 **UNIX** systems. Along with other Bell Labs innovations in computing technology, these systems are enhancing the way the nation's telecommunications network is planned, designed, built, and operated. Through licensing agreements with Western Electric, universities have installed over 800 **UNIX** systems, and government and

industrial facilities are using over 400.

The **UNIX** operating system can be used with computers of different manufacturers because it is small, cleanly designed, and written in a general-purpose programming language. Such portability in a computer operating system saves time and money.

Building on the past

The **UNIX** system is just one of many Bell Labs advances in computing science and technology over the years. Among our innovations:

- Application of telephone switching concepts and technology to early computers
- First demonstration of remote computer terminal and data link
- Conception of electronic analog computer
- First design of AND and OR gates for diode circuitry
- Formulation of Information Theory
- Invention of error-detecting and error-correcting codes
- Demonstration of first general-purpose transistorized digital computer
- Development of computer operating systems
- Design of computer languages, including ALTRAN, SNOBOL, L6, and C
- Creation of computer graphics techniques for storing,

manipulating, and presenting information

- Development of Fast Fourier Transform
- Design of central processors for switching systems having virtually no downtime

Looking ahead

Computing technology is having a major impact on the telecommunications business. It's increasing the Bell System's ability to provide new services and handle existing ones more efficiently. Today, for example, the nationwide telecommunications network links thousands of software-controlled electronic systems, making it by far the world's largest distributed processing network. We and our partners—Western Electric and the telephone companies of the Bell System—are putting technology to work so that the network will continue to evolve and expand its information-handling capabilities. The object, of course, is to meet the fast-growing and changing needs of Bell System customers.

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Manufacturing System Runs on Minis

SANTA ROSA, Calif. — Olympic Systems, Inc. has developed an integrated manufacturing system that is written in Basic and will run on minicomputers with 64K bytes of main memory.

The system is comprised of a set of eight on-line, interactive packages: a bill-of-materials processor, inventory management, sales order entry, materials requirements, shop-floor control, cost control, purchasing and inventory forecasting. Some of the packages can operate as stand-alone or can be interfaced with other manufacturing packages.

The bill-of-materials processor can handle multilevel, single-level, summarized and where-used inquiries

and reports, the vendor said. The inventory management package maintains balances for finished goods, raw materials and work-in-progress items.

The sales order entry package maintains the status of customer orders and generates sales order demand, backlog and shipping reports.

Shop-Floor Control

Time-phased, net requirements reports are produced in a regenerative mode in the event-driven by-custom-order material requirements package. The shop-floor control package produces operation sheets with routings, queue listings by machine center, performance by employee and

updates of shop work-order status.

Labor standards are developed from shop-floor feedback in the cost control package that is used in costing inventory parts and producing performance variances, the vendor said.

The packages run on Digital Equipment Corp. PDP-11, except inventory forecasting, which will be available in the third quarter. The packages can be adapted to other 64K-byte minicomputers, the vendor said.

The bill-of-materials processor is available for \$700, and the packages cost between \$500 and \$1,200 from the firm at 410 Macklyn Ave., Santa Rosa, Calif. 95405.

'Manman'
Now Available
On HP 3000

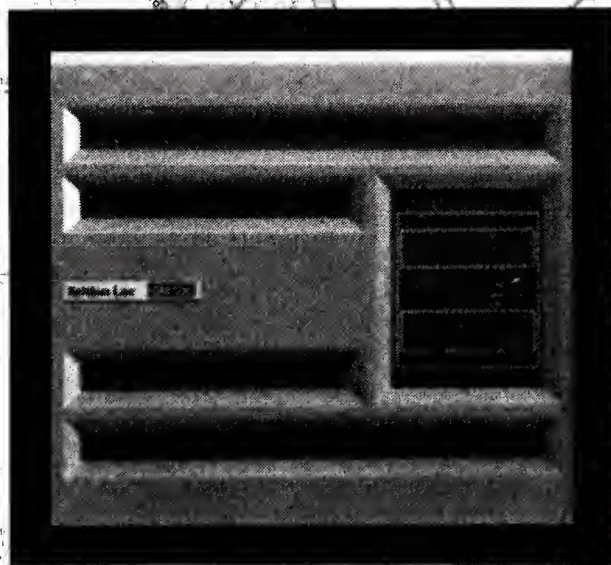
LOS ALTOS, Calif. — ASK Computer Systems, Inc.'s Manman Information System now is available on Hewlett-Packard Co.'s 3000 Series 44 minicomputer.

The Manman software modules reportedly need no modification to run on HP 3000 Series 44 and can be run on up to 96 terminals with this system.

The manufacturing management system module is available on the HP 3000 Series 44 for \$50,000. Order management/accounts receivable costs \$20,000. Accounts payable and general ledger each are priced at \$10,000.

As an HP systems house for equipment, ASK said it also can supply discounted hardware to users who buy the entire package. The vendor is located at 730 Distel Drive, Los Altos, Calif. 94022.

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Service Starts
For CAD/CAM

SANTA ANA, Calif. — Manufacturing and Consulting Services, Inc. (MCS) announced the Anvil-3000 Computer-Aided Design/Computer Assisted Manufacturing (CAD/CAM) Time-Share Service, a nationwide network that reportedly enables a company evaluating CAD/CAM to use MCS' Anvil-4000 software for the monthly rental cost of a terminal and time-share charges.

The company also unveiled the Anvil-3000 Graphic Resource Station (GRS), a semiautonomous unit operating under Anvil software that MCS claimed can be used to expand existing CAD/CAM systems. The Anvil-3000 Time-Share Service is available through more than 280 locations throughout the U.S. and offers Anvil-4000L CAD/CAM software. The Anvil 3000 features a Hewlett-Packard Co. computer and peripherals and costs about \$42,500, depending upon the configuration. The GRS can be leased for about \$3,000/mo, with a three-month minimum lease. Dumb terminals can be leased for use with the time-share service for \$1,750/mo, with a three-month minimum lease.

The vendor is located at 16812 Red Hill Ave., Irvine, Calif. 92714.

Package Updates Lists
On IBM Machines

VAN NUYS, Calif. — A package for the IBM 360, 370 and 4300 systems that combines the functions of list maintenance, subscription and reader service is available from Occidental Computer Systems, Inc.

The Mail List/Reader Service (ML/RS) system is designed to operate at close to maximum I/O speeds in list and label functions and provide for flexible master file creation with user or generated account codes, four-line addresses with phone number and foreign addresses.

Available on a 30-day trial basis, ML/RS is priced at \$2,960 from Occidental Computer Systems, Inc., 6666 Valjean Ave., Van Nuys, Calif. 91406.

Economist Examines Market

AT&T Control Tied to Terminal Supply

By Phil Hirsch

CW Washington Bureau

WASHINGTON, D.C. — An often-repeated argument at the annual meeting of the International Communications Association, held here recently, was that real competition to AT&T does not exist and, until it does, the phone company must continue to be regulated.

The best statement of this argument came from Dr. Lee Selwyn, a consulting economist who frequently testifies against Bell tariffs. Selwyn said that one way of measuring competition in the telecommunications industry is to analyze who supplies the terminals. Not only does Bell have the highest share of the installed base, but "its ownership share of the equipment which it does provide is 100%."

As a direct result, he contended, Bell gains tremendous power over both its customers and its competitors — prices assessed against the former can be raised without fear of losing business to the latter.

AT&T's customer base migration strategy "is a good example of this market power at work," according to Selwyn. The basic goal of the strategy is to force customers to replace older-generation terminal equipment, like the Model 701 PBX, with newer equipment such as Horizon or Dimension PABXs.

As Selwyn explained it, the key to the customer base migration strategy lies in Bell's "unique ability to raise rental rates on older equipment; in migration strategy parlance, this is known as "incremental willingness to pay" pricing ...

"Suppose that the current monthly rental rate for particular older generation PBX is \$1,000 and that the monthly rate for an equivalent Dimension system is \$2,000. On the

basis of market research, Bell determines that customers with older equipment would be willing to pay only \$200 more per month for the additional capabilities of the new equipment ...

Reduced Differential

"In a normal competitive industry, where no supplier has the ability to alter prices of previously sold equipment, the only way in which the differential between the old and the new could be reduced to the required \$200 would be for the supplier to reduce the price of the new equipment to \$1,200.

"However, the combined effect of the Bell System's market power and its total ownership

of all installed base equipment [allows] it to reduce the differential — not by lowering the price of the new, but by increasing the price of the old. Thus, Bell would seek to increase the monthly rate for the older equipment by 80%, from \$1,000 to \$1,800."

A state regulatory commission would have to approve the higher rate, of course, but many of them, according to Selwyn, have been persuaded to go along by the phone company's argument that charging business customers more for PBX equipment will avoid increases in residential rates.

Meanwhile, by raising rates on all terminals of a particular type, the phone company effectively

prevents competitors from getting a significant share of the new business generated. The number of users that decide, as a result of the price increase on their old equipment, to migrate to the new models, is so large that non-Bell suppliers can't satisfy more than a small percentage of the demand.

"Some customers will turn to non-Bell suppliers, but because of Bell's significant market power, any 'losses' of sales to competitors will be limited by the collective capacity of non-Bell suppliers to meet the demand — capacity which cannot possibly respond rapidly enough to the demand stimulated by migration-oriented

(Continued on Page 72)

Supercontroller Promised

By Brad Schultz

CW Staff

WASHINGTON, D.C. — The nation's second largest telephone conglomerate rushed an integrated data/voice switching system to market at the recent International Communications Association (ICA) conference here.

But General Telephone & Electronics had no name and no price for the product its GTE Telenet Systems subsidiary unveiled within weeks of competitive introductions by Data-point Corp. [CW, April 6] and an Exxon Corp. affiliate [CW, June 1]. Said to integrate data and voice traffic at up to 56K bit/sec, the switching system will not be delivered for a full year, spokesmen told the conference.

GTE Telenet Systems is the new name for Stamford, Conn.-based GTE Telecommunications Systems, Inc., whose sister company offers the Telenet packet-switched network.

By year's end, a spokesman said, GTE Telenet Systems will announce a name and a price for the system, which users can build from two PABXs — the GTD-1000 and GTD-4600 — already sold by another GTE arm, GTE Communications Products.

The latter is still developing a microprocessor-controlled Subscriber Data Unit (SDU) and a Data Access Channel Unit (Dacu) that users

will need to fashion the integrated data/voice system from existing GTD-1000s and -4600s, the spokesman noted.

The system reportedly offers synchronous data speeds of 2,400-, 4,800-, 9,600-, 19.2K- or 56K bit/sec on each time slot.

Wide Use Expected

"Our new system can substantially reduce data transmission costs and lessen congestion on telephone lines," a GTE Telenet Systems executive claimed at the ICA conference. "It should find wide use in office automation and high-speed data processing."

"You dial a connection, send large amounts of information rapidly, then hang up, conserving the system's key resource — time — and freeing the system for use by others who wish to speak or send data," he explained.

The unnamed system will cut users' need for dedicated lines, he added.

Within the system, the largest GTE PABX can switch more than 250M bit/sec, the spokesman asserted. The system interfaces any 1.544M bit/sec T1-type transmission facility.

GTE Telenet Systems has scheduled field trials of the system for later this year. The company's address is One Stamford Forum, Stamford, Conn. 06904.

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GE Offers Local Microwave Link

NEW YORK — A microwave communications link designed for short, line-of-sight transmission of data was introduced by General Electric Co. here last week.

The Gemlink Model LSD-052A will accept, transmit and recreate asynchronous coded data one way up to two miles to any RS-232C terminal. It will transmit at all transmission rates up to 9,600 bit/sec, according to GE.

Dubbed a "local-loop" communications system, the equipment has Federal Communications Commission (FCC)-type acceptance and operates out-of-doors on high-frequency 21.8-22 and 23-23.2GHz. According to David Hargreaves, manager of the GE Microwave Link Operation, the company is the first to be certified for the 23GHz band.

Part of Line

The data system costs less than \$4,000 and is part of a line of GE microwave products that the company said can also handle video, control and telemetry communications. Availability is immediate.

GE said that the Gemlink was designed to complement major intercity microwave networks and was developed as an alternative to dedicated lines, lasers, infrared and conventional microwave systems.

AT&T Control Tied to Gear

(Continued from Page 71)

pricing policies," Selwyn explained.

Free competition, when it occurs, "will bring the same beneficial effects of economic efficiency to the telecommunications industry that it has to other American industries... but the telecommunications industry is not now competitive from the customer's perspective, which is the relevant economic viewpoint," he said.

"Although AT&T has lost its position as an absolute monopolist, its position as the industry's price leader is not seriously challenged. The level of competition is not yet sufficient to instill any downward pressure on the Bell System's prices or alter its policies, a condition which is likely to persist for some time."

Polymakers' View

However, policymakers in Congress and at the Federal Communications Commission (FCC) assume that viable competition does exist in the telecommunications marketplace, Selwyn said. He pointed out that the FCC's Second Computer Inquiry Decision, finalized last December, and the Communications Act rewrite bill now gestating in the Senate, are both based on this premise.

Unless the policymakers are turned around, Selwyn believes, the user will end up worse off than he is now. He will be paying even higher profit margins to the telephone company and will have less ability to "decide for himself how his telecommunications service is to be furnished."

The recent increases in Wide-Area Telecommunications Service, private-line and Message Transfer Service rates are indicative of what's coming, Selwyn added.

Because no cable is required, it eliminates right-of-way complications and can overcome geographic or man-made obstacles, the firm said.

However, the company noted that in heavy rainfall, problems with data transmission could occur depending on bit error rates.

A high-speed data system that can handle T1 or T1-compatible TDM multiplexed signals is now under final development, according to GE. The company expects this addition to

allow interconnection of communications networks as remote terminals to mainframes for factory distributed data processing and computer-aided design and manufacturing systems and use as trunk lines between private PABX telephone lines. This model is expected to be available in July, GE said.

More information is available from Microwave Link Operation, General Electric Co., 316 E. 9 St., Owensboro, Ky. 42301.

Facet Terminals Emulate DEC, Hazeltine, Lear Siegler Units

GREENWICH, Conn. — Facit, Inc. has introduced three microcomputer-based alphanumeric, asynchronous Ascii terminals that have the capacity to emulate other terminals through switch selections.

The 4410 emulates the Lear Siegler, Inc. ADM 3A and Hazeltine Corp. 1410 terminals and has its own Facit 4410 Extended Mode with editing and other features. Featuring a 12-in. screen and a 5-in. by 7-in. dot matrix in a 7-in. by 10-in. field, the model has a fixed keyboard and can be used in computer-aided design (CAD) systems in communication with microcomputer systems and various instruments, the firm said.

The 4420 provides 70 different functions, emulating the Digital Equipment Corp. VT52, Hazeltine

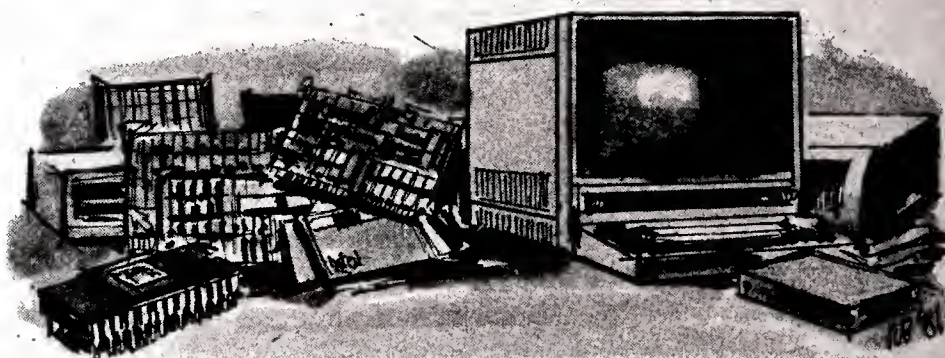
1500 and Lear Siegler ADM 3A. In each case, its Enhanced Mode gives access to an additional variety of functions, according to Facit.

The 4420 features a detached, low-profile keyboard and a nonglare tilt-able screen. A printer port, format control and smooth scrolling are standard, the vendor said.

The 4430 has many of the same capabilities and features of the 4420, Facit said. It is fully DEC VT100-compatible and is directly aimed at DEC users with VT100 terminals and systems houses using DEC computers.

All the terminals feature green, nonglare display screens.

The 4410 costs \$995, the 4420 costs \$1,426 and the 4430 costs \$1,997 from Facit at 66 Field Point Road, Greenwich, Conn. 06830.



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Enhanced 'Burcom-11' Links PDP-11s to Burroughs Gear

CHAPEL HILL, N.C. — Version 2.0 of Applied Information Systems, Inc.'s Burcom-11 communications software system allows Digital Equipment Corp. PDP-11s to communicate with Burroughs Corp. computers using asynchronous communications lines.

The enhanced version also supports

the Burroughs poll-select and point-to-point conversational protocols.

By using standard Burroughs communications techniques, Burcom-11 can be installed without modification to the Burroughs equipment and software. The product features multiple buffers for full utilization of the transmission link and error detection and record retransmission are handled automatically.

Burcom-11 runs on the PDP-11 under DEC's RSX-11M, RSX-11S, IAS and RSTE/E operating systems.

A single-machine perpetual license costs \$4,400, the vendor said from Suite 207, 500 Eastowne Drive, Chapel Hill, N.C. 27514.

MDB Interfaces Offer Support For X.25 on DEC

ORANGE, Calif. — MDB Systems, Inc. has announced its support for the X.25 data communications protocol through its DUP-11 and DUPV-11 synchronous communications interfaces.

X.25 was designed as the standard protocol for public common-carrier, packet-switched networks, as well as for general-purpose, multicomputer or terminal communications.

The DUPV-11 is a Digital Equipment Corp.-compatible interface for Q-bus computers, and the DUP-11 is DEC-compatible for Unibus.

According to the vendor, both boards offer data rates to 500K bit/sec and will accommodate bisynch and Digital Data Communication Message Protocol (DDCMP) in byte-control and Synchronous Data Link Control, Advanced Data Communication Control Process (ADCCP) and High-level Data Link Control bit-oriented protocols, as well as X.25.

The DUPV-11 with X.25 capability costs \$950 and the DUP-11 with X.25 capability \$1,350, MDB said from 1995 N. Batavia St., Orange, Calif. 92665.

United Systems Offers Printers

DAYTON, Ohio — Two desktop printers that print 21 or 32 columns of alphanumeric characters have been announced by United Systems Corp.

The Digitec 6430 produces fade-free records by electric writing, while the 6470 utilizes the thermal printing technique, and each can print bold-face characters for special emphasis, the vendor said.

The printers are priced at \$399. Deliveries will start in mid-July from United Systems Corp., 918 Woodley Road, Dayton, Ohio 45403.

Local Net Boasts Disk Update Feature

OAKLAND, Calif. — Digital Microsystems, Inc. has announced that its Hinet local network now provides a feature that allows continuous duplicate updating of two-system hard disks.

Any malfunctions in user stations in the network are confined to that single station, the vendor said.

The feature is included in the per-network license fee of \$300 from Digital Microsystems, Inc., 1840 Embarcadero, Oakland, Calif. 94606.

Bunker Ramo Bank System Gains Support for SNA

NEW ORLEANS — Bunker Ramo Corp. is offering software modules that enable its Bank Control System to interact with Systems Network Architecture (SNA) communications software used in large IBM mainframes. The company has also unveiled a product that automates administrative functions of branch banking.

The Bank Control System 90 is a branch banking automation system. The SNA capability for it and its associated application software products allows connection to IBM systems and a growth path to more complex distribution network environments, the vendor said.

A set of SNA functions and capabil-

ities equal in definition to an IBM 3276-type device is also offered.

The software modules are free-of-charge on a configured system that includes eight 12-in. terminals, a high-performance communications interface, an advanced memory expansion, floppy disk and 120 char./sec printer. That system sells for \$31,000, the vendor said.

The Adtran software computerizes loan operations, record changes, bookkeeping, new accounts, report printing and personal banking functions in the platform and operations areas of bank branch offices.

It is licensable for \$2,500 per module, Bunker Ramo said from 35 Nutmeg Drive, Trumbull, Conn. 06609.

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The typewriter-like keyboard connects to the CRT unit with a stretch cord. You can move it to one side or put it on your lap for ease of use.

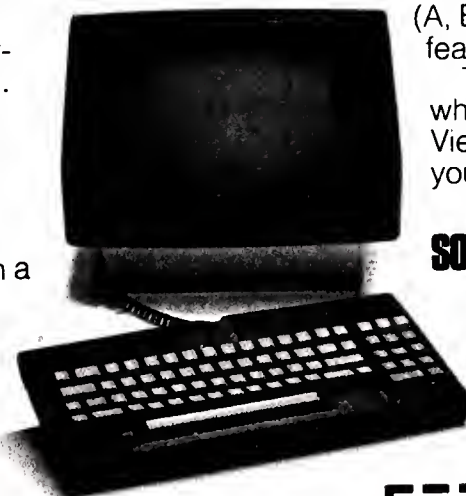
Two-position screen tilt gives you added viewing convenience.

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Viewpoint is available in two models (A, B). Model B, in addition to all the other features, includes a glare filter.

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Teleray Controller Allows Six Terminals Per Port

MINNEAPOLIS — The Teleray Division of Research, Inc. has introduced a peripheral controller that reportedly provides the means to cluster up to six CRT or printing terminals on a single computer port, or up to six CRT terminals on a single hard-copy printer.

The PC-2 reportedly operates on the principle of contention logic.

When used as a terminals-to-computer interface, the press of a button at any one of the input terminals logically connects the terminal's communications lines to the computer port. Another press of the button frees the computer to be accessed by another terminal, the Teleray spokesman explained.

Printer Features

When the PC-2 is used as a terminals-to-printer interface, the termi-

Converter Aids BSC Systems

FEASTERVILLE, Pa. — Alphamatrix, Inc. has introduced a protocol converter that enables asynchronous line printers to operate with systems running under IBM's Binary Synchronous Communications (BSC) protocol.

The Model BAE-806 reportedly provides a communications interface between any of the Ascii RS-232C line printers and any DP system that supports the industry standard IBM 2780/3780 devices.

All buffering, code conversion and real-time requirements are performed automatically by the converter, the vendor said.

Both printer and converter may be connected to a BSC port on the CPU, or they can be located remotely by using a pair of synchronous modems. Other standard features include data compression, forms control and programmable tab stops, eight LED status indicators and an internal/external synchronous clock, the vendor spokesman added.

The converter costs \$2,300 from Alphamatrix at 1021 Millcreek Drive, Feasterville, Pa. 19047.

Portable Terminal Accesses POS Units

HUNTINGTON BEACH, Calif. — A portable terminal that enables restaurant management to telephone any of its dining facilities equipped with Dynamic Automated Restaurant Terminal (Dart) point-of-sale systems and get current reports from a computer is available from Standard Logic, Inc.

The Dart 5100 Send/Receive Mini-Terminal reportedly features a standard typewriter keyboard with 16-key numeric cluster and communicates with the Dart in-store computer over telephone lines. It also features a 5 by 7 dot matrix printer with 80-col line width and 30 char./sec speed. Data transmission is asynchronous at 30 bit/sec.

The price is \$3,000 from Standard Logic, 5456 Industrial Drive, Huntington Beach, Calif. 92649.

nal communications lines can be logically connected to the printer and on/off, suspend/resume codes can be sent from the printer to the selected terminal, according to the vendor.

The PC-2 reportedly operates on either 120- or 240V, 50- or 60Hz and consumes seven watts of power. It costs \$375.

Each terminal-to-controller cable, with integral access switch and indicator, costs \$100. Quantity discounts are available.

More information is available from Teleray Division of Research, Inc., Box 24064, Minneapolis, Minn. 55424.

Unit Converts RS-232 Signals

PALO ALTO, Calif. — A combination port-sharing device and RS-232 to 20 mA current loop converter is available from Giltronix, Inc. The GRS232/CLS24 is best suited for applications where the peripheral devices are located 50- to 1,000 ft from the main CPU.

The port-sharing switch allows each terminal to connect to any one of the three devices (CPU ports, modems, printers and so on) and the current loop converts the RS-232 signals, a Giltronix spokesman said.

The unit costs \$298 from Suite 44, 450 San Antonio Road, Palo Alto, Calif. 94306.

Interface Has 4K-Byte RAM

NASHUA, N.H. — A serial communications interface that combines the serial function with a buffer capacity of 1K byte, 2K bytes or 4K bytes of random-access memory (RAM) on one board is available for Dataroyal Inc.'s IPS-5000 and IPS-5000-A intelligent dot matrix printers.

The RS-232 interface incorporates individual microprocessors to transmit and handle the X-on/X-off communications protocol.

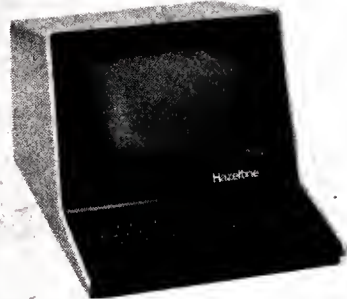
The unit accepts data at rates up to 9,600 bit/sec. The integrated board connects to the main board via the 20-pin interface board cable.

The interface costs \$150, Dataroyal said from 235 Main Dunstable Road, Nashua, N.H. 03060.

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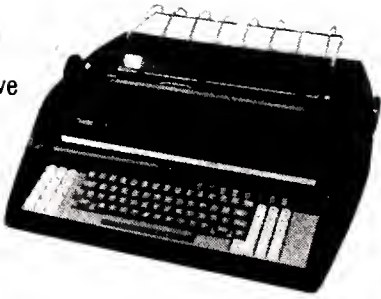
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Controller Compatible With IBM 3274, 3276

SUNNYVALE, Calif. — Agile Corp. has unveiled printer controllers that allow IBM 3274 or 3276 cluster terminal control units to be connected to non-IBM compatible printers.

The Series 5287s support Systems Network Architecture/Synchronous Data Link Control in addition to synchronous and bisynchronous modes.

The device connects to the IBM control unit through an IBM-standard coaxial cable as an IBM Category A device and functions as a logical unit Type 1 or Type 3. It features a 3,440-char. buffer and either RS-232- or Centronix Data Computer Corp.-compatible parallel connections.

The series includes two models that

enable any commercial printer to be interfaced to IBM 3274 or 3276 controllers, the vendor claimed.

The printer controllers cost \$2,500 from the vendor at 1050 Stewart Drive, Sunnyvale, Calif. 940986.

Touch-Screen Digitizers Bow

BOHEMIA, N.Y. — Two touch-screen digitizers designed to enable untrained users to gain access to computer data by touching a display with a finger have been announced by TSD Display Products, Inc.

The 12-in. and 15-in. digitizers consist of a thin transparent curved panel that mounts in front of a standard

Vector 'RBTE' Software Expedites Remote Job Entry, Data Distribution

WESTLAKE VILLAGE, Calif. — Vector Graphic, Inc. has announced a software package said to be capable of linking up any of the company's data or word processors to a remote system.

The Remote Batch Terminal Emula-

tor (RBTE) was designed to expedite remote job entry or data distribution by transferring complete files between Vector systems or between company systems and another data or word processor equipped with the package or terminal emulation capability, the company said.

The software requires bisynchronous modems, and transmission rates can be up to 240 char./sec over a dial-up line and up to 960 char./sec over a leased conditioned line, the vendor claimed.

The RBTE communications software is priced at \$500 from Vector Graphic, Inc., 31364 Via Colinas, Westlake Village, Calif. 91362.

Modem Unveiled By Intertel

ANDOVER, Mass. — A private-line modem compatible with the Bell 202T and Intel Corp. 80/10 multibus is available from Intertel, Inc.

The SBS 1200's finger-board connector conforms to EIA/V.28 digital interface specifications. It features a maximum component height of less than .42 in. and operates in full-duplex on four-wire unconditioned lines, offering onboard diagnostic capability.

There is also an analog loopback switch for full ac loopback and six EIA interface indicators to monitor TXD, RXD, DCD, RST, CTS and TST. In addition, a built-in statistical equalizer optimizes the modem's performance over a range of line conditions.

The modem costs \$225, Intertel said from 6 Shattuck Road, Andover, Mass. 01810.

Workstation Offers Conversion System

MOUNTAIN VIEW, Calif. — Tri-Data Corp. is offering a telecommunications workstation that converts teleprinter and CRT terminals into smart workstations and two-way communications terminals that can store and edit both the send and receive data.

OZ is a single terminal that can operate either as a Telex station, or, with modem options, as a direct distance dialing, TWX and Telex device.

OZ costs \$1,090 from Tri-Data at 505 E. Middlefield Road, Mountain View, Calif. 94043.

Amdax Translator Increases Bandwidth

BOHEMIA, N.Y. — Amdax Corp. has unveiled a wideband translator that increases the bandwidth and capacity of the company's Data Exchange coaxial cable network system.

The Model 1009W DAX functions as the head end of a two-way broadband coaxial cable network and features an increased bandwidth to 54MHz, providing a total of 252 full-duplex point-to-point data circuits (nine channels).

The wideband translator costs \$5,250 from Amdax at 160 Wilbur Place, Bohemia, N.Y. 11716.



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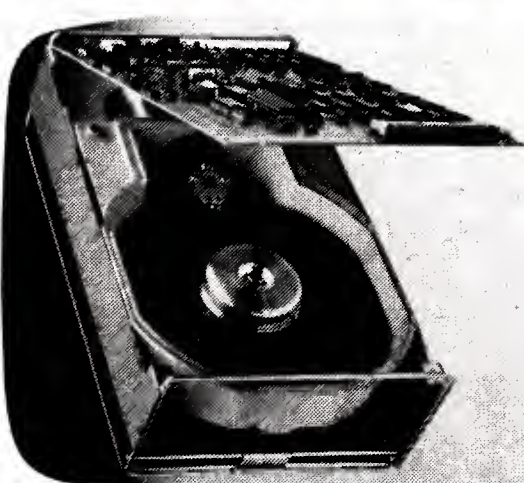
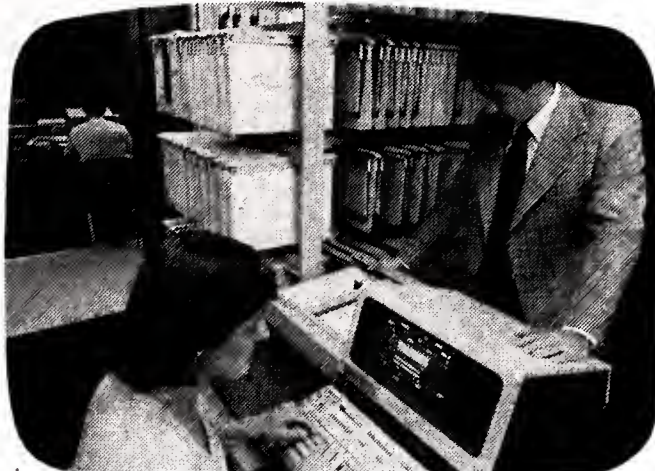
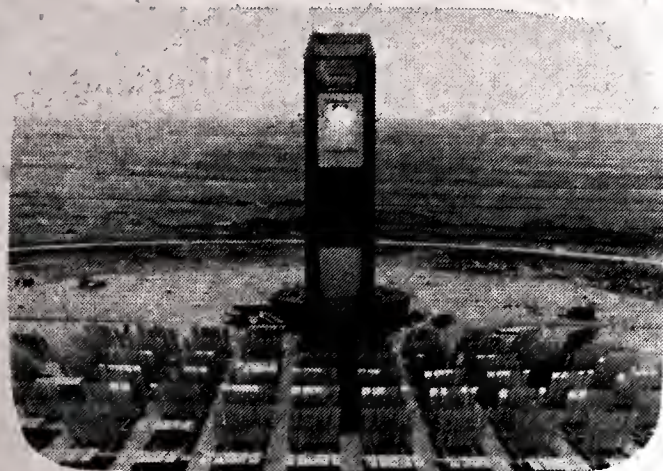
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INFORMATION ENGINEERING

By Clive Finkelstein

Part 6: Infomethod — The Information Engineering Development Plan

This is the last of six articles on information engineering, a planning methodology for developing corporate data models. It is intended for users and management with no computer experience. Information engineering provides formal DP methodologies for data analysis, data base design and synthesis of program specifications.

The articles cover the following topics: (1) information engineering methodologies, (2) developing a corporate data model, (3) information analysis, (4) data analysis and data base design, (5) procedure formation and (6) information engineering development.

Structured analysis, structured design and structured programming have been adopted by many organizations throughout the world. These software engineering techniques have been effective in improving the quality of analysis and design. They provide a discipline that is lacking in traditional approaches.

Two main methods are used: process-centered and data-centered.

The process-centered approach is advocated mainly by Yourdon, DeMarco, Weinberg, Gane and Sarson. (A list of books by these authors appears at the conclusion of this article.) This concentrates on the use of structured analysis initially to identify processes, data flows and data

stores. These are documented in data flow diagrams, data dictionaries and minispecs. The data flow diagram is used to develop program structures through structured design, which then leads to structured programming.

The data-centered approaches of Jackson, Warnier and Orr concentrate first on identifying the data structure. From this is developed a program structure.

User Involvement

Software engineering is intended primarily for use by analysts and programmers. It was not designed to be applied directly by users. Communication with users comes primarily through the data flow diagram. Information engineering, on the other hand, brings user department personnel, management and data processing together in a partnership. Its techniques draw on the experience of all three groups.

Users and management directly apply the techniques of strategic requirements planning, information requirements planning, information analysis and procedure formation.

On the other hand, DP personnel directly apply the techniques of data analysis, program specification synthesis and data base design.

Information engineering is data-oriented in its initial application. In-

formation analysis and data analysis concentrate on developing a data model that mirrors the organization, division or application area examined. From this data model, procedures are developed. Procedure formation, program specification synthesis and the later process modeling stages of data analysis are procedure-oriented.

Interfaces exist between software engineering and information engineering. These are particularly useful for organizations that have standardized on some or all of the software engineering techniques. These interfaces enable specific information engineering techniques to be introduced as appropriate.

Information engineering does not depend on software engineering, but can be used completely independently. For software engineering users, however, information engineering enables easy transition to data base and provides formal techniques for defining new procedures. It provides a formal, repeatable method for program design as an alternative to structured design. It results in direct generation of structured English program specifications for input to structured programming. In addition, the method can be used to derive source program statements directly, bypassing conventional

(Continued on In Depth/2)

A complete reprint of this six-part series on information engineering is available through Computerworld. Further information can be obtained from Jane Desberg, Computerworld, Box 880, 375 Cochituate Road, Framingham, Mass. 01701. (617) 879-0700.

IN DEPTH

(Continued from In Depth/1)
programming.

The data flow diagram provides useful input to data analysis. Data analysis uses business rules to define data relationships in the organization. By involving users directly, business rules are used to develop a schematic data model, which is cross-checked against the data model produced from the third normal form entities.

This data model can be developed,

using data analysis, by users, DP analysts or both, working in partnership.

The resulting data model is stable and directly reflects business policy in its data relationships. This data model extends significantly beyond the data structure diagram approach used by Weinberg and DeMarco.

Procedures from the "old logical model" data flow diagram can be used to determine data access paths through the data model. These paths

lead to development of transaction usage maps, which enable an early estimate of relative logical response times. (Once the physical implementation of the data model is determined, these can be expressed as actual physical response times.) Based upon the user's response time expectation, the data model may be optimized to improve the potential performance of response-critical transactions.

Transactions that process concur-

rently against the data model are used to produce a loaded composite map. This clearly documents total system load and identifies highly referenced access paths. These access paths are optimized during physical data base design.

Data analysis leads directly into physical data base design. The data model and third normal form entities provide direct input to schema design. The individual transaction usage maps are input to program subschema design. Integrity design addresses recovery, restart, security and audit considerations. The transaction usage maps provide design input for archiving, reorganization and restructuring of the data base during operations design. Final physical data base optimization is carried out during performance design.

Data analysis provides an easy transition to data base design. The data flow diagram helps identify data for analysis.

New Logical Model

Structured analysis provides little guidance for transition from the "old logical model" to the "new logical model" data flow diagram. This transition is dependent upon the experience and intuition of the structured analyst.

Procedure formation (see Figure 1), on the other hand, provides a highly repeatable, formalized approach to deriving new procedures from a data model. Events that bring about changes in the data model are used to "synthesize" procedures. Events are grouped together in procedures based upon the conditions that must be satisfied before (or by) execution of events.

The procedures that are formed are derived directly from the data model, which may consolidate data across various functional areas in an organization. Once the data has been consolidated (rather than dissipated redundantly throughout the organization), new procedures may be derived. These procedures offer dramatic new business opportunities that may not have been obvious from the limited perspective of the old procedures. The new procedures provide direct insight for developing the new logical model data flow diagram.

Structured Design Interfaces

Structured design provides an effective technique in developing modules for top-down implementation.

Module logic is grouped together to achieve low module coupling. The data and switches that must be communicated between programs are minimized.

Related logic is grouped together in program modules to achieve high functional cohesiveness. The logic necessary to carry out a particular function resides in the fewest possible modules, resulting in easier development and subsequent maintenance.

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The structure charts produced during structured design document clearly the module structure and essential module coupling.

Information engineering uses a data model, which may have been developed based on structured analysis interfaces, to derive relevant processing events. Procedure formation groups together events to form procedures. These are logical procedures: They may be implemented physically as manual procedures or may be automated. An automated procedure may represent one or several programs when implemented.

Functional Cohesiveness

Each event is comparable to a separate module in structured design. Moreover, the approach used by procedure formation automatically produces events with high functional cohesiveness. In its final form, an event defines the logic for a single primitive application function.

The procedure map produced during procedure formation achieves the same objective as a structure chart. It graphically defines the module structure and interactions through its documentation of events and associated conditions. It leads directly to documentation of formal structured English specifications.

More important, the experience and intuition demanded by structured design no longer determines the quality of the module structures produced. Procedure formation was designed to be applied directly by users, who have a detailed understanding of the meaning and use of data, as well as the procedures required to create and maintain that data.

Specification Synthesis

Procedure formation leads to program specification synthesis (Figure 1): The discipline applied during procedure formation continues into formal derivation of detailed program specifications. Synthesis of these specifications is based on the availability of a data dictionary and the data access tables and procedure maps produced by procedure formation.

Program specification synthesis results in derivation of specifications expressed directly in structured English. Detailed module specifications can be produced for input to structured coding. Alternatively, when applied directly by programmers, the output from procedure formation can be used to formally derive source program statements directly in Cobol, PL/I, Pascal and so on. This bypasses conventional programming.

The formality of procedure formation and program specification synthesis ensures that the logic derived is highly repeatable. Furthermore, application of procedure formation does not require a knowledge of computing; rather, it requires data awareness, which is held by users. In addition,

the formality of program specification synthesis is such that people with only limited technical training may formally derive structured English specifications.

The procedure maps produced during procedure formation may subsequently be transcribed into structure charts for those organizations that use structured design for formal program documentation.

Structured Programming Interfaces

Procedure formation produces procedure maps and procedure statements (see Figure 1). Program specification synthesis produces module specifications. Procedure statements may be expressed in narrative form, Nassi-Scheiderman charts or structured English. Module specifications may be similarly expressed. These provide direct input to structured programming.

The data-centered approach advocated by Jackson results in a program structure based directly on the data structure to be processed. These programs are highly maintainable.

Orr extended the work done by Warnier, which resulted in easy-to-read Warnier-Orr diagrams. They provide clear documentation of program logic. This was extended further by Orr into a technique for analysis based also on Warnier-Orr diagrams.

The work done by Jackson and Orr is particularly useful for analysts and programmers. It is concentrated at the level of programming — or at most, the analysis of a specific application. The use of these techniques in modeling an entire corporation is questionable. However, their initial data-centered approach acknowledges the relative instability of procedures when compared with the longer term stability of data.

This data orientation is the foundation of information engineering. Instead of the programmer looking outward to the organization, information engineering draws on the greater organizational experience and awareness of users and managers. It uses this experience to define data models that mirror the organization. This initial data-oriented approach then leads to formal derivation of program logic.

Business Systems Planning

Business systems planning, as applied by IBM, has been particularly effective in gaining involvement of senior management in establishing directions for information systems. It further identifies the productivity and cost savings potential of information systems.

The success of this planning must be measured not only by the awareness it generates in top management of its need to be involved; it must also be measured by the effectiveness of the information systems that are subsequently installed. But the success of subsequent implementation has been found to be highly dependent upon the prior data base experience of the DP department.

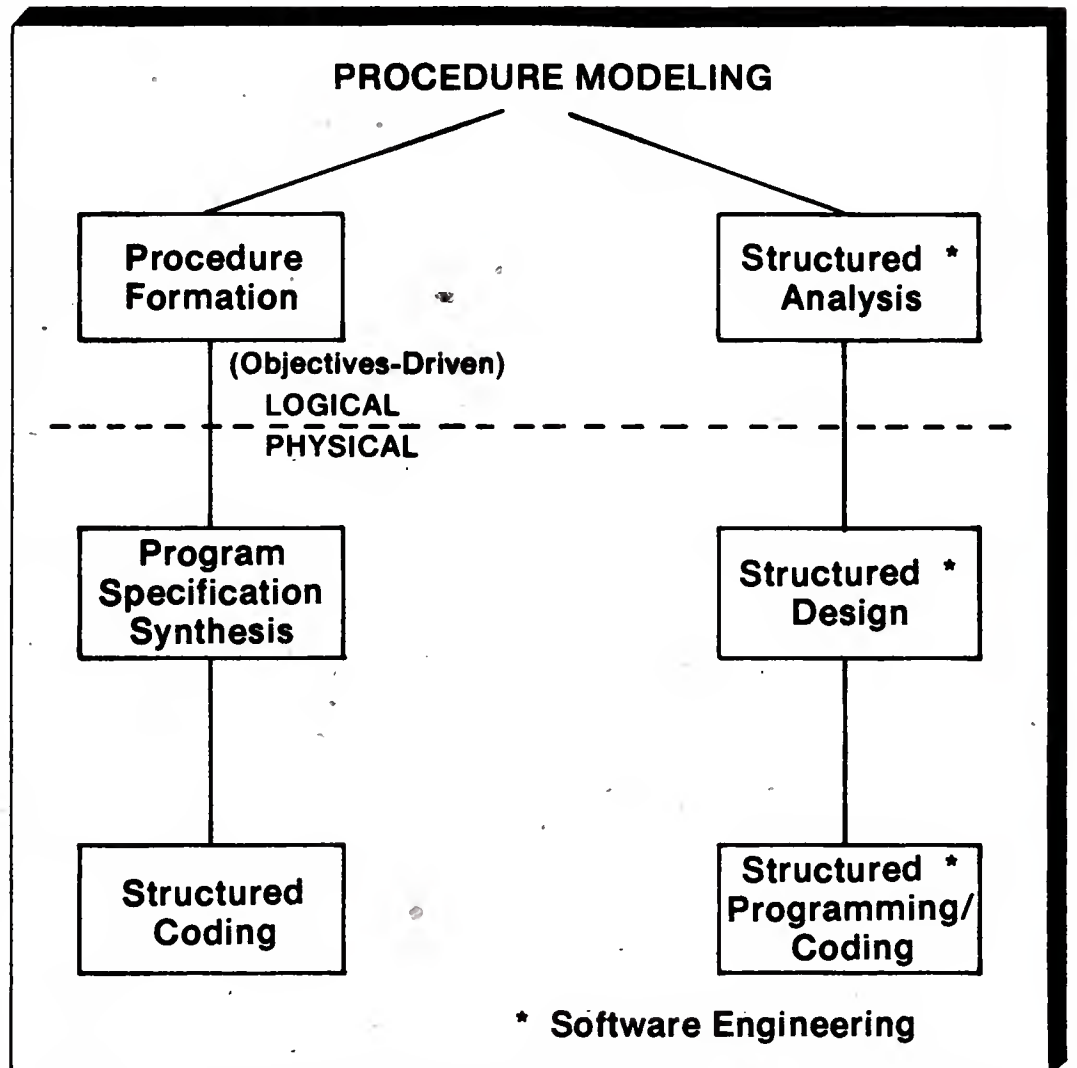


Figure 1. Procedure Modeling Methodologies of Information Engineering

dent upon the prior data base experience of the DP department.

Business systems planning is initially procedure-oriented. Based on top management identification of

corporate objectives and problems, relevant processes are determined. These lead to an identification of data classes and then data bases.

(Continued on In Depth/4)

"... a set of hard design methodologies which will be the mainstay of MIS within the next five years."
James Martin, Computerworld: Sep 17, 1980

INFORMATION ENGINEERING METHODS

The Information Engineering methods are a unique set of analysis and design techniques. They establish a highly productive design partnership between end-users, management and data processing personnel in the development of Information Systems and Decision Support Systems. These methodologies have been predicted to have a greater productivity impact on application development than did Software Engineering in the 1970's.

The Information Engineering methods were initially developed in Australia, and since 1977, have been accepted by many organizations (government and commercial) in Australia, New Zealand, SE Asia and USA.

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IN DEPTH

(Continued from In Depth/3)

Information engineering goes beyond business systems planning. It directly involves top management in establishing the strategic direction of the organization for the future — through strategic requirements planning.

It focuses on productivity and profitability potentials from this strategic direction through information requirements planning.

It involves top management, middle management and users directly in developing a data model based upon the established strategic direction and objectives. This is achieved by information analysis.

New procedures derived from the data model by procedure formation may then lead to reorganization and restructuring to fully achieve the benefits offered by the corporate data model developed while using information analysis.

Information engineering can provide the DP department with methodologies for physical design and implementation of the corporate data model.

The techniques of data analysis, data base design and program specification synthesis provide a highly formalized environment for physical implementation of the data model as an integrated data base and the procedures as programs for processing against that data base.

More important, a partnership and

communication standard is established between users, management and DP.

Decision Support Systems

The interest in decision support systems reflects an increasing awareness of the computer as a management tool. Decision support systems introduce new approaches for using and manipulating data in an information system. They are dependent upon an information system that

models the organization.

Information engineering provides that model, through the use of strategic requirements planning, information requirements planning and information analysis. New insights into the effective use and manipulation of a data model is provided by procedure formation.

Data Dictionaries

There has been much interest and concern over the last few years in the

use of automated data dictionaries. The products available are either integrated with specific data base management systems (DBMS) or are independent and able to be used with many DBMS products.

Much attention has been directed to selecting the most appropriate data dictionary. This is similar to the emphasis in the early '70s on approaches for selecting DBMS products. The success of both selections is dependent upon understanding the orga-



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IN DEPTH

nization and its requirements. But the selection of a data dictionary represents only 5% of the effort required. The remaining 95% is in loading the organization's data resource into the dictionary.

The availability and use of an automated dictionary is essential for recording and managing this data resource for large projects. For small projects (such as an individual application or department), sometimes a manual dictionary may suffice. The

data dictionary is used in data base design and in program specification synthesis. Formal derivation of module specifications in structured English is achieved through the use of a dictionary.

End-User Languages

Information engineering directly involves users, managers and analysts in developing a data model and the procedures that create and maintain data. The data model and proce-

dures are physically implemented as data bases and programs. Procedure formation and program specification synthesis can be used for formal derivation of inquiry and reporting programs.

Alternatively, inquiry and reporting programs can be developed directly through end-user languages. Many of these languages were designed for use by personnel without programming experience. They can be used by the users and managers who

developed the data model, as well as other personnel throughout the organization.

Relational Data Base Systems

The availability of relational data base products, such as IBM's System/38 and SQL/DS, RSI's Oracle and Tandem's Encompass, bring with them a need for new data base design techniques. Information engineering is based on the practical application of relational theory. The data models produced by information analysis and data analysis are in third normal form and map directly into the relational data base environment.

For those organizations using conventional DBMS or conventional files, the third normal form data model results in a stable physical data base structure that can accommodate business change with a minimum of reprogramming.

Information analysis and procedure formation identify data procedures based upon the strategic direction established by top management. These clearly identify the security and audit controls that must be exercised. The information engineering security and audit methodology provides active, participative control — rather than the passive, after-event reporting in common use. Furthermore, auditors are able to participate directly during information analysis and procedure formation to ensure the essential controls are enforced.

The insight gained through information analysis and procedure formation can result in a reassessment of organizational structures and control. These have led centralized organizations to adopt a decentralized environment with distributed systems. Other decentralized organizations have maintained that decentralization, but have moved to centralized control. The information engineering methodology of distributed analysis formalizes the evaluation of distributed system alternatives.

Office of the Future

Interest in the office of the future reflects the hardware and communications opportunities the new technology is opening up. Total information control through integrated office, data processing, copying, communication and information retrieval is now possible.

(Continued on In Depth/6)

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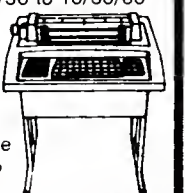
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IN DEPTH

(Continued from In Depth/5)

What has been overlooked, however, is the impact this will have on the organization.

Most organizations must structure themselves quite differently to achieve the full potential offered by this new technology. This will have an impact on the organization far greater than that of data base — even for those organizations that already have an integrated data base.

A move into the office-of-the-fu-

ture environment without an understanding of this impact will at best mean lost opportunities. At worst it may create organizational chaos.

We must first understand the organization better. We must determine its needs for today and tomorrow. We must reflect these in a data model that mirrors the organization.

A strategic direction that encompasses office-of-the-future opportunities is an essential input. The new potential that is opened up demands

that users, managers and DP personnel alike break away from their past procedural limitations.

Information analysis steps aside from the present and looks firmly to the future. It creates an environment that allows the organization to plan its future as if it is starting again. It establishes a migration strategy to move into the future.

The new insights provided by procedure formation can suggest new business opportunities and reorgani-

zation possibilities. These can maximize the procedural potential of an office of the future.

A typical information engineering project involves not only DP personnel, but also users and management. Because of the different disciplines and experience represented by these personnel, strong project control and project management are essential. Infomethod provides that management and control.

The emphasis in this series of articles has been to introduce the concepts of information engineering. It will be apparent to the reader who has followed the entire series that information engineering is highly formalized and controllable.

The discipline evident in information engineering is also reflected in Infomethod. This provides formal management control that breaks each methodology into phases, tasks and subtasks. It directly addresses an environment that involves users, management and DP personnel working together.

In introducing any new techniques, barriers have to be overcome. These include:

- The problem of choosing between many different analysis and design methodologies.
- Unsympathetic management.
- An uncertain relationship between user and DP personnel.
- Conflicts with organizational standards and expectations.
- Incompatible social structure.
- Significant changes in how an analyst works.
- Work load on analyst/designers.
- Resistance to new techniques on the part of experienced staff.
- Difficulties in learning new methodologies.

Infomethod provides assistance in overcoming these barriers. Much of the analysis work carried out previously by the analyst is moved directly to the user.

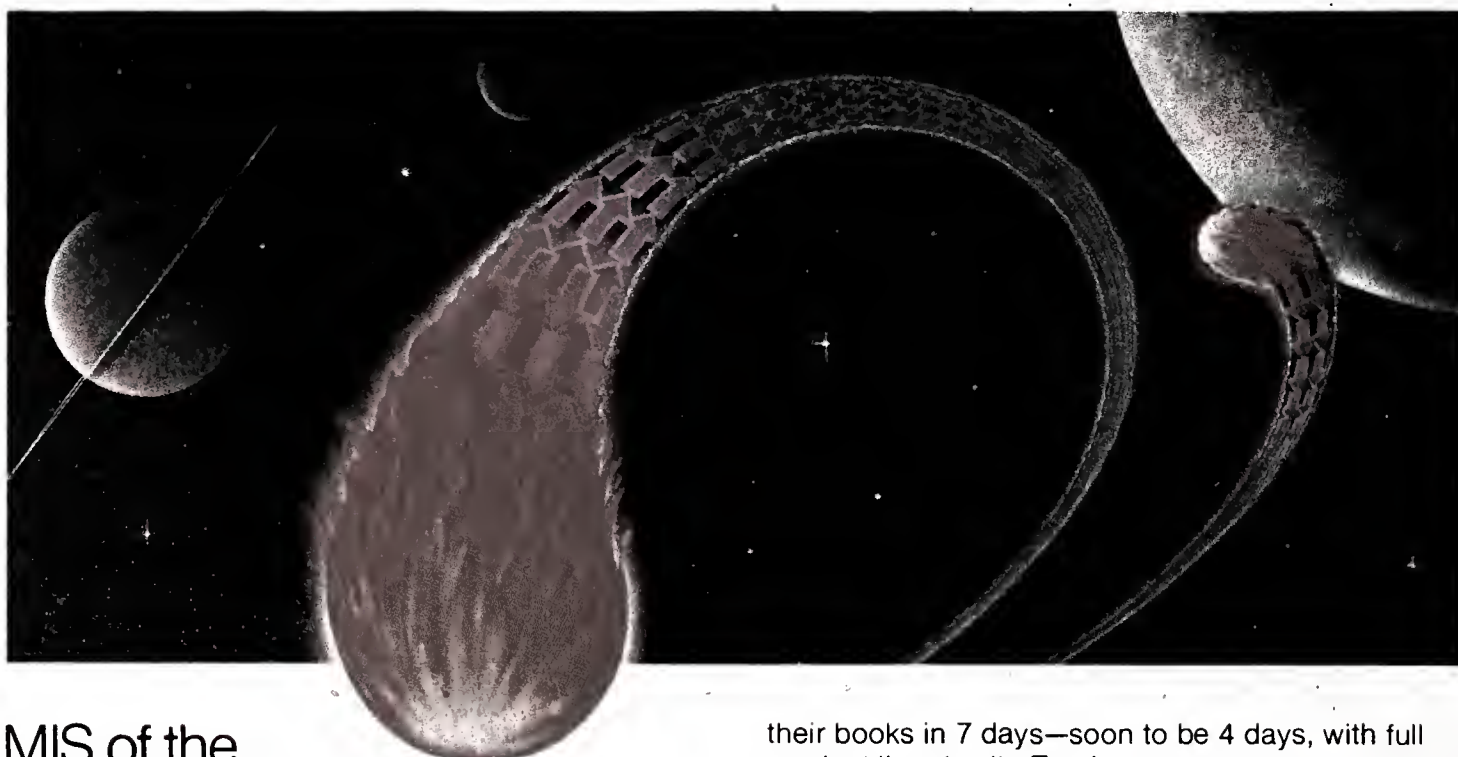
Evaluating Methodologies

There are three main approaches to application development. These are:

- Application development plans.
- Structured analysis and structured design.

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• Information engineering (Infomethod).

Application development plans include Pride, Spectrum, Method/1 and SDM/70. These products are effective in providing project management and control. They identify a series of stages and tasks in the system development cycle. They define what is to be done and when, provide checklists and forms, and tasks are detailed — in some cases more than 200.

These application development plans are described as "technique-free." They do not provide guidance on how to go about developing the system, nor do they provide analysis and design techniques essential to success. Instead, they rely upon techniques presently used within the organization.

For the organization with formal standards, this may be an advantage. But for the organization without such standards, chaos can result, with each analyst and programmer "doing his own thing."

Users of each of the previously mentioned products have introduced information engineering within their systems development cycles. Because these products are technique-free, different information engineering methodologies fit easily into their framework. Some minor incompatibilities and inconsistencies are apparent with one or two of the products. However, the end result is a far more effective systems development approach than if no techniques had been used at all.

Structured Techniques

In contrast to the application development plans described above, the structured techniques concentrate on providing analysis and design methodologies. They are DP-driven rather than user-driven. Structured analysis and structured design address the "how" of analysis and design. Stradis, developed by Gane and Sarson, concentrates on providing a systems development methodology based on these techniques. This also addresses the "what" and "when."

Information engineering provides both user-driven and DP-driven analysis and design methodologies. It brings about a partnership between users, management and DP. It establishes a communication standard between people throughout the organization and addresses the how of system development, ranging from corporate planning methodologies through user-driven information.

This methodology provides DP-driven data analysis, data base design and program specification synthesis. It provides security and audit and distributed analysis techniques. In addition, its user-driven organizational impact techniques lead to possible corporate restructuring to benefit from the new insights and opportunities provided by information engineering.

Systems Development Methodologies			
OTHER ATTRIBUTES	Application Development Plans	Structured Techniques	Infomethod
Tutorial Documents	Yes	Yes	Yes
Known Experience Base	12 years	Seven years	Four years
Compatibility With Other Techniques/ Schemes	Most possible with overheads	Yes, selectively	Yes, selectively
Area of Application	Business and other systems	Systems whose data flow can be communicated graphically	All business and other systems
Defined Procedures	Loose set of steps defining what and when	Iterative, well-defined steps defining what, when and how	Iterative, well-defined steps defining what, when and how
Specialized Graphics		• Data flow diagrams • Structure charts	• Data models • Procedure maps • Usage maps
Training Support	In-house only	Public and in-house	Public and in-house

Figure 2. Comparison of Development Methodologies

Infomethod provides an information engineering development plan and an information engineering control system that also address the what and when essential for effective management control.

Figure 2 compares the attributes of the systems development methodologies currently available. All methodologies provide tutorial documentation.

The experience base of the application development planning products is greatest: some have existed for 12 years. There is an experience base of seven years with the structured techniques and four years with information engineering.

In assessing the compatibility of the methodologies with other techniques, the application development planning products (being technique-free) can interface with the structured techniques and also with information engineering. Minor incompatibilities and inconsistencies exist with some of these products when attempting to incorporate other techniques. The structured techniques and information engineering can coexist and may go with the application development planning products.

Concerning the application area of the different methodologies, the application development planning products and Infomethod were designed to be used with business and other systems. The structured techniques are most effective with those

systems whose data flow can be communicated graphically.

Differences are apparent among the defined procedures for applying the different methodologies. Application planning products provide a

loose set of steps defining what and when. On the other hand, Stradis and Infomethod provide iterative and specific steps defining what, when and how.

(Continued on In Depth/8)

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IN DEPTH

(Continued from In Depth/7)

No specialized graphics are used by the application development planning products. The structured techniques rely on data flow diagrams and structure charts. Information engineering, as reflected in Infomethod, uses schematic data models, procedure maps and usage maps.

In the area of training support, detailed in-house courses in application development planning are provided only to organizations that

'Through bitter experience, we in DP and our organizational colleagues outside DP have come to appreciate the essential characteristics of a good methodology for systems development.'

purchase those products. Both in-house and public courses are available for the structured techniques and for information engineering.

The problems faced by system and application development can be traced back to the analysis and design phase. They stem from one or

more of the following:

- Insufficient understanding of the organization's real needs.
- Inadequate management control.
- Inaccurate, irrelevant or out-of-date analysis and design documentation.
- Inadequate user and management

involvement.

• Insufficient acknowledgment of skills and the associated learning curve.

Through bitter experience, we in DP and our organizational colleagues outside DP have come to appreciate the essential characteristics of a good methodology for systems development:

- It must be understood by users.
- It must demand user involvement.
- It must enhance productivity by minimizing programming.
- It must define what should be.
- It must assist decisions regarding strategic directions established by the organization.
- It must allow for future technology by enforcing a clear separation between logical and physical design.
- It must be self-verifying.
- It must not be application-bound.
- It must be equally relevant to central data base or decentralized files.

Information engineering addresses most of these characteristics directly. Above all, it succeeds in breaking down the communication barriers between users, management and DP. It provides formal methods where experience used to be the only guide for success.

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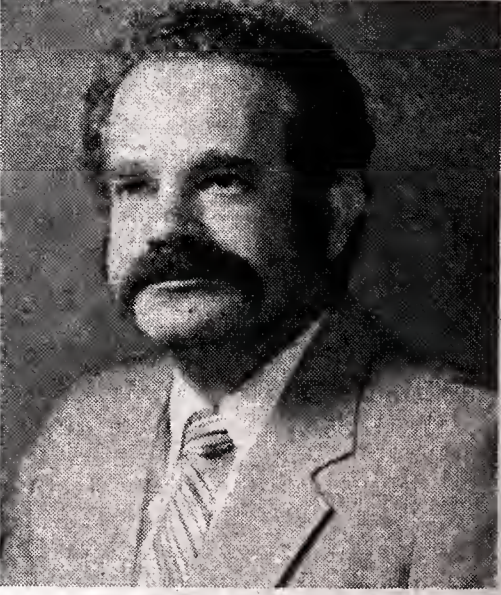
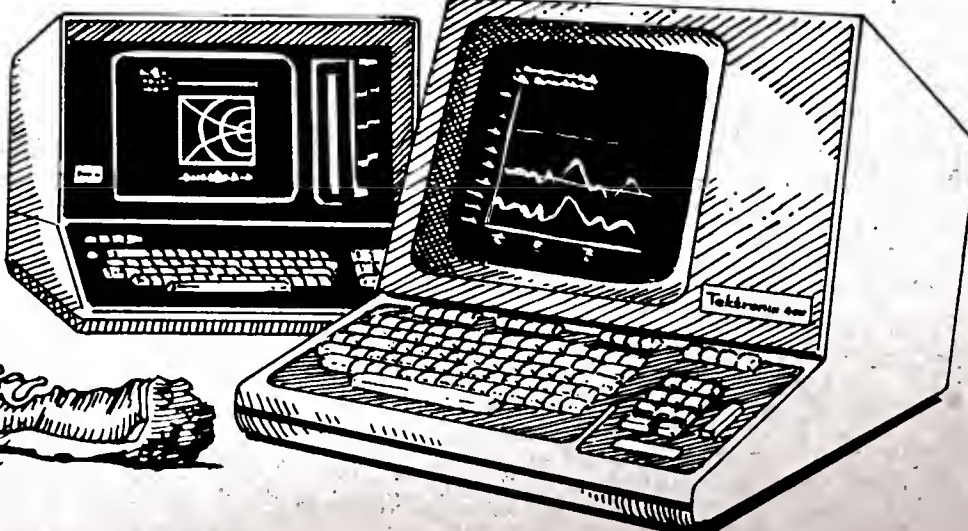
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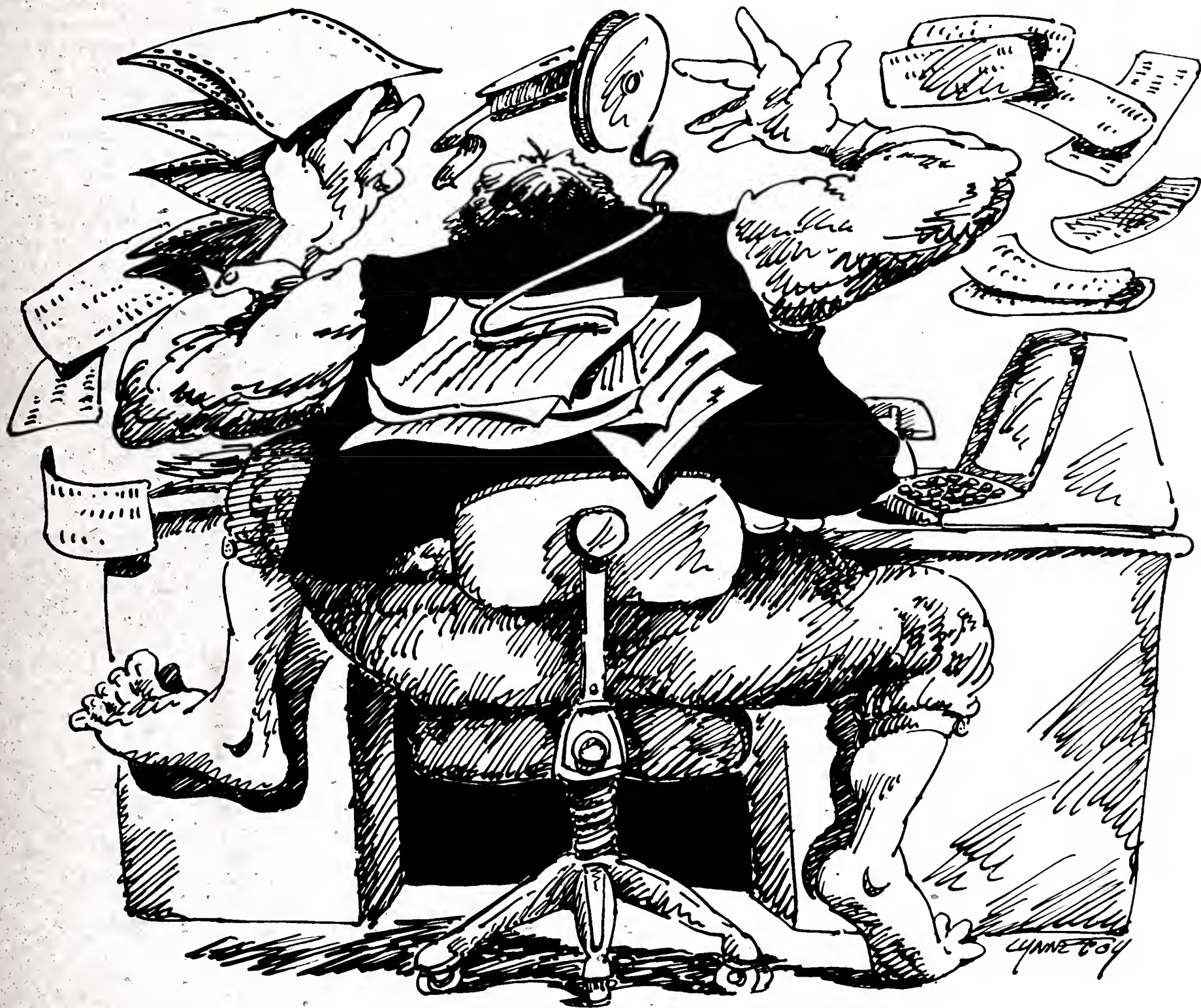
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Clive Finkelstein has spent 20 years in DP, 15 of which were with IBM in the U.S. and Australia. He founded Infocom Australia in 1976. His firm is now known as Information Engineering (Aust) Pty. Ltd. and has subsidiaries in New Zealand and the U.S. The latter, known as Information Methods (U.S.A.) Corp., is located in Boston.

Retrofitting the Data Center



(Or How to Avoid the Shoemaker's Children Syndrome)

By John P. Murray

All management information services (MIS) departments suffer, to varying degrees, from the "shoemaker's children" syndrome. Often, the time, attention and money spent to install labor-saving tools and processes are directed toward those areas that will save time and effort for the MIS department's clients or will improve the client's working environment. Usually these tools and processes are not readily available to MIS. This situation often seems to be exacerbated in the case of the typical data center.

The center is under pressure to support existing systems, to bring new systems into operation and to move to the next system in the MIS backlog. Coupled with the demand to complete today's processing, these pressures tend to make it rare that ex-

isting processes and programs are reviewed with the objective of improving the MIS environment.

This is, particularly within the context of the typical data center, a most unfortunate circumstance. As the demands placed upon the data center increase and the level of data center complexity rises in order to provide a reasonable level of service, data center managers find it increasingly difficult to find the time to make improvements. However, significant improvements in the overall operation for both MIS employees and clients are possible through "retrofitting" the data center operation.

MIS management can improve the data center operation through review and, where appropriate, changing the operation's components. While the subject most intimately affects the data center operations manager, the benefits derived transcend the data center. Most data centers have become such integral parts of

the organization's total operation that any improvement in the data center must translate to improvements throughout the organization. The potential for improvement is great in many data centers; in some, the potential would have to be classified as dramatic.

Where to Begin?

Given the understanding that an effort to improve the functional aspects of the data center is not only desirable but critical in some organizations, how can it be accomplished?

Obviously, because of the magnitude of such an effort, MIS department management as well as senior management must be willing to support the effort. Success is dependent upon strong management support. In addition, appropriate funds and talent for planning and managing the effort must be forthcoming.

Once management is committed to a retrofit, how does one begin? The

only effective way is through developing and implementing a project approach. The scope of the effort must be defined. The amount of time and work required and the results to be achieved must be identified.

As with any successful project, a phased approach should be used. This approach will provide for checkpoints that can be used to determine actual progress, to assess the appropriateness of the work completed to that point and to produce concrete results that will have a positive effect on those doing the work.

Who should lead the project? Careful consideration must be given to the selection of the project leader. However, first it is imperative that the absolute requirement to "clean up" operational programs be recognized as one of the primary requirements of the project, and therefore programming skills will have to be devoted to that effort. This means

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that someone (not necessarily the project leader) with programming skills will have to be assigned to the project. This can be a member of the organization's system and programming staff or perhaps a contract programmer who has been retained to provide the required skill.

Changes in operational programs will necessarily be minor. Because of this, someone will suggest that, in order to save money, the changes be made by a data center staff member. This is absolutely unacceptable! Data center personnel should never, under any circumstances, be allowed to modify programs.

The project leader might be a member of the data center staff, a member of systems and programming or an outside consultant. The primary objective should be to select a person who sees the value of the project and has sufficient interest to see it through. If a consultant is chosen, it is mandatory that he have a strong operations background. Success with the management of a data center function, or past data center consulting assignments that have been brought to a successful conclusion, are particularly important considerations in this selection process.

Determining Directions, Needs

An appropriate question might be, "Why the need for such an effort? How did the data center get into this situation in the first place?" There are several quite understandable reasons. The dynamic, volatile nature of the MIS effort, the constant changes in technology and the dramatic reductions in the cost of hardware all contribute to circumstances which make a great deal of the data center function obsolete, uneconomical or cumbersome.

As an example, some installations still rely heavily on autocoder programs that are punched-card driven. Other installations have excessive re-runs, simply because of inadequate computer operations instruction. Many installations suffer from poor client relations because reports do not balance, are late or are sent to the wrong place. These conditions will not improve until someone is willing to take the time and spend the money to make them change.

When considering the improvements that will affect hardware efficiencies, it can be argued, particularly in the case of larger CPUs, that because of the declining cost of this equipment, the concern with efficient utilization has become somewhat academic. According to this view, the time and money invested in data center "cleanup" can be put to better use by simply acquiring larger, faster hardware. But while efficient hardware utilization is certainly not the critical issue it was several years ago, the effort to identify and eliminate processing bottlenecks will pay handsome benefits.

There are also ancillary benefits as-

sociated with data center cleanup. Improving the data center service level as it pertains to the center's clients may outweigh any tangible savings achieved through increased equipment utilization. There can also be intra-MIS department benefits. An improved service level that provides more testing time for that largest of all data center clients, systems and programming, will very favorably affect MIS morale. This can, in turn, lead to increased MIS produc-

tivity.

Another benefit, perhaps somewhat more subtle, is improving morale within the data center. Two forces will come into play here. The improved service level will lessen tension between data center clients and data center employees. Simply doing a better job will increase the pride of those employed in the data center and they will produce higher quality work. A strong data center operation can make a real difference

throughout the entire organization.

A formal project approach will provide a certain discipline and control in the data center, which is lacking in many installations. Success with this approach during the project can demonstrate its ongoing usefulness and desirability. This can be particularly effective in data centers operating on a "catch-as-catch-can" basis. This type of center benefits most from retrofitting. An argument could be built that the emergence of a more



disciplined, better controlled data center is worth the expense of the project, even if little else is gained from the exercise.

Once the preliminary requirements, management commitment, project orientation and selection of the project leader have been accomplished, project planning can begin. The thrust of the project effort should be to accomplish retrofitting through improving the data center portfolio. This portfolio is made up

of more than just the operational applications programs within the data center.

Other components include items such as the mix of jobs, processing schedules, improved use of tape and disk, data center documentation, data center controls and reporting of production reruns. Taken as a whole, in conjunction with the operational applications programs, these items affect the overall operation of the data center. The better their quality, both

individually and collectively, the better the quality of the total data center operation.

Each of these components will provide potential benefits. In addition, there are several software tools that will be helpful, not only in achieving the project goals, but as a part of the ongoing data center effort. While the project can be carried to a successful conclusion without these tools, progress will be more rapid and the results greater if they are

available.

Software packages that provide job accounting statistics and allow the data center personnel to manipulate that information in an easy, meaningful manner are desirable. A software package that allows the data center employees to assign and allocate disk space as they desire — and that will handle a number of required disk processing functions such as the allocation of additional disk space on an automatic basis during processing — adds a significant degree of flexibility to the project. A software package that will provide automatic and positive control of tape processing should be installed in any data center that has a library of more than 1,000 tapes.

The value of these software packages to the MIS department transcends the retrofit project. They should be a standard part of the data center operation. Provided good packages are selected and properly used, they will pay for themselves in a very short time. Care must be used in the selection process, as with any software package. A good package is easily installed, uses few resources and provides a high degree of reliability.

First Step

The primary step in a project's implementation is to define its scope — outline what is to be accomplished, how and the time frame required to achieve the desired goals. In addition to lending structure to the effort, this definition will provide a basis for future analysis that can be used to identify the areas of greatest immediate payoff. This is an important factor: All data centers have their unique strengths and weaknesses. Areas of high priority in one data center may not be of particular importance in another.

In addition, as is the case with any project, early results boost morale and have a positive effect on the remainder of the project. Thus, the first goal should be one that will be considered a step toward significant results. If possible, this goal should also be one that can bring about at least some of those results in a short time. Projects often fail because they produce results only at the end, which always seems to be a long way off.

A phased approach will produce stronger support for the entire project.

Job Flow, Job Mix

The process of selecting the items for their appropriateness and priorities depends upon the particular data center and the personalities involved; each situation will be different. While it is impossible to suggest priorities without specific information about the data center, it may be helpful to review some of the areas affected and suggest actions that could be taken.

(Continued on In Depth/12)

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IN DEPTH

(Continued from In Depth/11)

First, the processing mix of jobs can be analyzed. The center can use software that provides job accounting information to develop a profile of the system's operational characteristics. In those installations where accurate job accounting information has not been available, or where it has been available but not used, the "first cut" information may produce some rather startling facts.

The reason for this is really rather straightforward. In many installations, a great deal of CPU resource is wasted. While what may appear to be a great deal of activity is going on and a lot of jobs are processing, the cause may be a poor balance of jobs. Often, much less than the potential throughput is being achieved.

In many installations, a great deal of the CPU resource is wasted as a result of an excessive amount of wait time. Simply put, the CPU is available for processing, but work is not being moved rapidly enough to keep the CPU busy. It may appear to the computer operator that a great deal is being accomplished — indeed, all the peripherals may be in use. However, without the availability of the job accounting information, conjecture about the actual amount of work being processed is simply that: conjecture.

Job accounting software can produce a variety (really a plethora) of reports. This information can show

in great detail exactly what is happening in every machine partition at any given time. An analysis of this information will tell what is actually occurring in the CPU. The first time this information is obtained, it often shows an excessive amount of wait time attributable to resource contention.

Analysis of the job accounting information and changing the job mix to better balance the various resources will give greater compatibility in the processing of available jobs. This will in turn produce improved CPU utilization and efficiency and will increase total throughput.

A word of caution is in order here. While total throughput (work processed) will increase, some jobs may indeed require increased processing time. Improving the mix of jobs with regard to the effective use of the CPU will require a change in the balance of I/O usage and job priorities which may mean that some large, resource-bound jobs will take longer. If, however, an improved overall balance is achieved, an increased number of smaller jobs can be processed in the same time span. The result will be more total throughput.

In the first attempt at improving the job mix, emphasis should be directed toward locating and relieving the operational bottlenecks. As an example, it may be found — quite contrary to what may be conventional wisdom — that processing several large jobs concurrently, because of their unique processing characteristics, will prove to be very efficient. Without effective software aids to provide information, the only way an accurate determination can be made will be through a heuristic approach. Most data centers simply do not have the time or resources to carry out trial-and-error experiments.

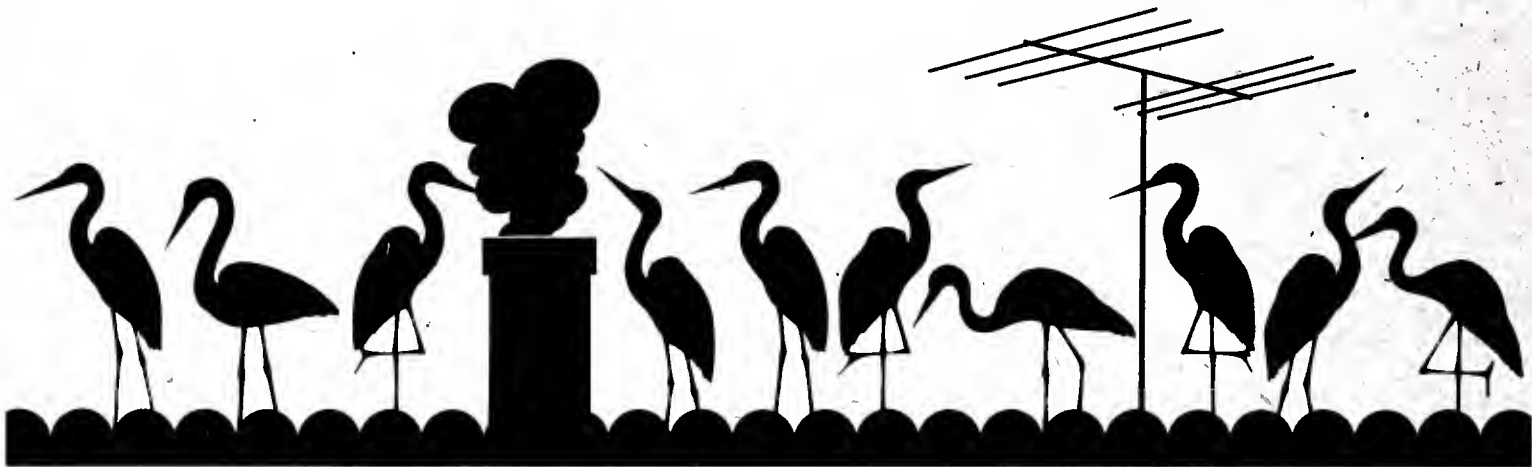
Planning and Scheduling

A corollary to adjusting the data center CPU job mix and refining and improving the data center portfolio is to review and, where practical, adjust the data center operations schedule. Assuming there is one, you should pose several questions:

- Is the data center schedule regularly reviewed and updated?
- Is that updating done on a realistic basis?
- Is the schedule based, insofar as practical, upon the needs of all data center users, including systems and programming?
- Does it take into account a reasonable amount of processing efficiency, or do one or two strong clients dominate the schedule priority-setting process?

The data center schedule should not necessarily run on a FIFO (first in, first out) basis. Conversely, few data centers use, although many clients will claim they do, the LIFO (last in, first out) basis. And, unfortunately, some data centers seem to have a proclivity for the Fish (first in, still here)

(Continued on In Depth/14)



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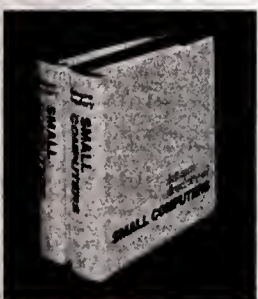
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IN DEPTH

(Continued from In Depth/12)
method of scheduling.

The salient point to keep in mind is that in addition to being a production control document, the data center schedule is also a political document. It should produce the most effective data center resource utilization in combination with the highest degree of client satisfaction. While this is admittedly a difficult task, it can be mitigated if changes are accompanied by facts. As work is shift-

ed to improve the utilization of the equipment, the information produced by the job accounting system can help bolster the case being built by the data center staff to support these shifts.

Data center work should not be scheduled intuitively, although much is. Data center scheduling is not an art; it should be based on accumulated facts that include factors such as client needs, resource availability and capability of the data cen-

ter to respond to particular needs. Data center scheduling, when based upon the whim of some member of the staff, is often symptomatic of larger problems.

Old Wine, New Bottles

Operational application programs constitute a large portion of the data center portfolio. In installations that have been in operation for a number of years, a large group of older operational programs will have been built

up. Unlike old soldiers, old programs never seem to fade away. They gain an existence of their own and continue to be used for processing. It is not at all unusual to discover programs that were written for older, much smaller machines being processed inefficiently on larger systems that have been installed in their place.

For example, a program written for a 64K CPU and a very limited disk capacity may now be processed on a very large (perhaps 2M-byte) CPU with a very large disk capacity. While the equipment for which this program was originally written has long been replaced, nothing has been done to attempt to improve the program to take advantage of this larger, faster equipment. It is clear that new programs would improve operational efficiencies. It is not inappropriate to say these old programs produce data center "drag."

The job accounting software can be put to good use here. In order to identify these inefficient programs, the software can be used to produce a listing of programs operating on the system in order of the amount of resources they use. This information can then be used as a basis to review those programs which appear to be operating inefficiently in order to effect changes that will improve their operation.

What are some of the criteria for seeking ways to improve the operational characteristics of these programs? Blocking factors are one area where you can achieve positive results. Investigation will uncover any number of programs which, having been written long ago, handle the equivalent of one (card) record at a time. These programs should be changed to optimize their record-handling capacity in line with the current equipment.

The subject should be viewed from a long-range posture. More than just correcting the existing program, blocking factors must be considered. Appropriate standards must be put in place and enforced to ensure that new programs, as they are produced, also make maximum use of blocking factors. The goal should be, considering larger, faster CPUs, to move the data into and out of the CPU as fast as possible.

Disk vs. Tape Processing

How dependent is the program on tape processing? Can this processing, at least in part, be transferred to disk? Again, in dealing with programs that have been a part of the operational portfolio for a long time, it is quite reasonable to assume that when the programs were written, tape was the only way to handle the processing. It is rather likely that the environment has changed and that increased disk processing is now a practical choice.

If the shift from tape to disk processing will relieve processing bottlenecks, the shift should be made, even if it means installing more

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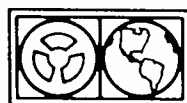
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disks. It is still a belief in some installations that tape processing is more cost-effective than using disks. However, given the rapidly declining cost per byte of disk processing, this becomes an increasingly tenuous argument. This is particularly true when one considers the inherent advantages of disk processing in improved CPU utilization. The factors of increased processing speed, fewer read/write errors, fewer operational mistakes and fewer overall processing delays make disk processing attractive.

Use of disk instead of tape is another area where standards should be set and enforced on a continuing basis. The I/O configuration should be considered and, based upon the disk availability, a maximum standard for tape usage for any new program should be set. The data center should refuse to accept any program for operation that violates that standard. The widespread belief that disk processing is too expensive needs to be changed.

A disk management software package will greatly facilitate the movement of processing from tape to disk. At least some of these packages allow the change to be affected through the JCL; in these cases, the work can be accomplished within the data center and no programming help will be required. One area that can be very easily exploited is the change from tape to disk work files. This change will speed up processing and cut down on the work required in the computer room to change tapes.

Use of the disk management software will also prove to be most beneficial in automated disk space gathering during processing runs. Often the disk space specified in a program will, because of increased data, prove insufficient. When this occurs under normal situations, the program will abort. The software package should provide an automatic facility to seek out unused space, place the additional data in that space and complete the processing. It only takes a few large program failures resulting from insufficient disk space to pay for the software package when one considers the time and frustration involved in reruns.

A Look at Coding

Consideration of the operational programs should include examination of the code. This is one area where someone outside the data center must be involved. In many instances, analysis will show sections of code that are no longer used and files which, while they may have been required at one time, are no longer necessary. It is not unusual to find operational practices where, when an output file is produced by a program, it is simply destroyed. The processing flow has changed; the programs have not! While it could be argued that this is a rather minor concern, why put up with it?

Reviews of programs in an attempt

to determine their effectiveness in today's environment can, depending upon the status of the installation, produce dramatic improvements in processing and in the data center service level. Because of the nature of this work, it will probably be viewed as undesirable by members of the staff, and it may be necessary to bring in a contractor to do the job. In any event, the results, if the work is carried out correctly, can pay large dividends.

The lack of accurate, current documentation, which is an MIS malaise, is no less of a problem in the typical data center. Sound documentation is just as critical within the data center as in any other section of the organization. The need may be more urgent in the data center because the operation must go on, regardless of difficulties. Many sections of an organization can stop operations for several days with little impact on the business; this is not the case in the data

center operation!

The place to begin is simply to refuse to accept new operational programs that do not conform to data center documentation standards. Of course, this presupposes the existence of data center standards, something that may not be a fact in many installations. Enforcement of this posture can prove to be a traumatic experience, but it can, and should, be done. People in the data center cannot.

(Continued on In Depth/18)

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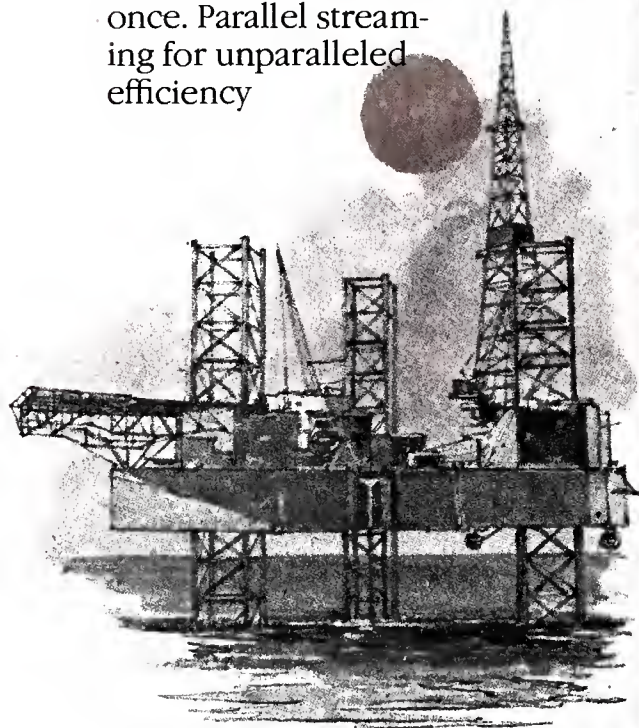
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IN DEPTH

(Continued from In Depth/15)
not blame anyone else if they are not willing to set and enforce standards of their own.

In addition, a review and cleanup of the existing documentation within the data center must be carried out. What areas should be addressed? Operator instructions, data entry forms and instructions, report balancing procedures and report distribution instructions are some of the specific areas that should be re-

viewed and, where appropriate, corrections made.

Strong Controls

The effort to improve the overall service level of the data center operation cannot be effective unless strong data center controls are in place and only if those controls, once installed, are enforced. This really becomes the quality control aspect of the data center operation.

Several basic questions need to be

posed: Do the systems being processed within the data center carry adequate controls? Are these controls clear and effective? Do the controls lend themselves to ease of balancing, or does the person responsible for the balancing have to be possessed of some arcane knowledge in order to successfully balance the reports?

Attention should be paid to developing programming standards that will, where practical, provide for automatically checking in-balance

conditions from program to program within systems. This is really not a particularly difficult or time-consuming process; it will not require much additional hardware resource and the benefits can be large. Properly developed, the controls can be established to abort processing in the event that an out-of-balance situation arises.

When the computer is utilized to handle automatic system controls, benefits accrue to the entire organization, not just the MIS department. Systems that are out of balance and not processed to completion will conserve processing time, both in processing systems that will have to be rerun and in avoiding the reruns. The embarrassment and the concomitant frustration associated with incorrect reports returning to the data center will be reduced.

The perception of the overall quality and service level of the MIS effort can be improved through using computer-controlled balancing procedures. This is really one example of how MIS can help itself, an example of overcoming the "shoemaker's children" syndrome.

Attention to Reruns

Reruns, always a touchy subject, should be given appropriate attention. While this item may not fit strictly within the framework of retrofitting the data center, it is an important component of the data center portfolio. Are accurate, factual records currently being maintained which outline the rerun activity within the data center? Are the types and causes of the reruns accurately reported? If the answers to these questions are no, work should begin at once to gather and report this information.

The information can be gathered and reported without undue effort. Use of the information can provide vital details about the quality of the data center operation. Trends can be identified. What programs or systems cause continuing difficulty? Why? Is poor documentation or lack of operator training the reason for the difficulty? Is part of the problem related to input supplied by the data center clients?

There is never time in any MIS department to address all concerns that arise; choices have to be made and priorities set. In the process, the subject of retrofitting the data center should be given a great deal of consideration.

John P. Murray is director of management information services (MIS) for the Ray-O-Vac Corp. in Madison, Wis. He is responsible for worldwide MIS activities.

Murray has 20 years of DP experience, 10 of which have been devoted to the management of data centers. As a member of the Data Processing Management Association, he has held every office in the Southern Wisconsin Chapter and has been awarded two outstanding performance awards by the chapter.

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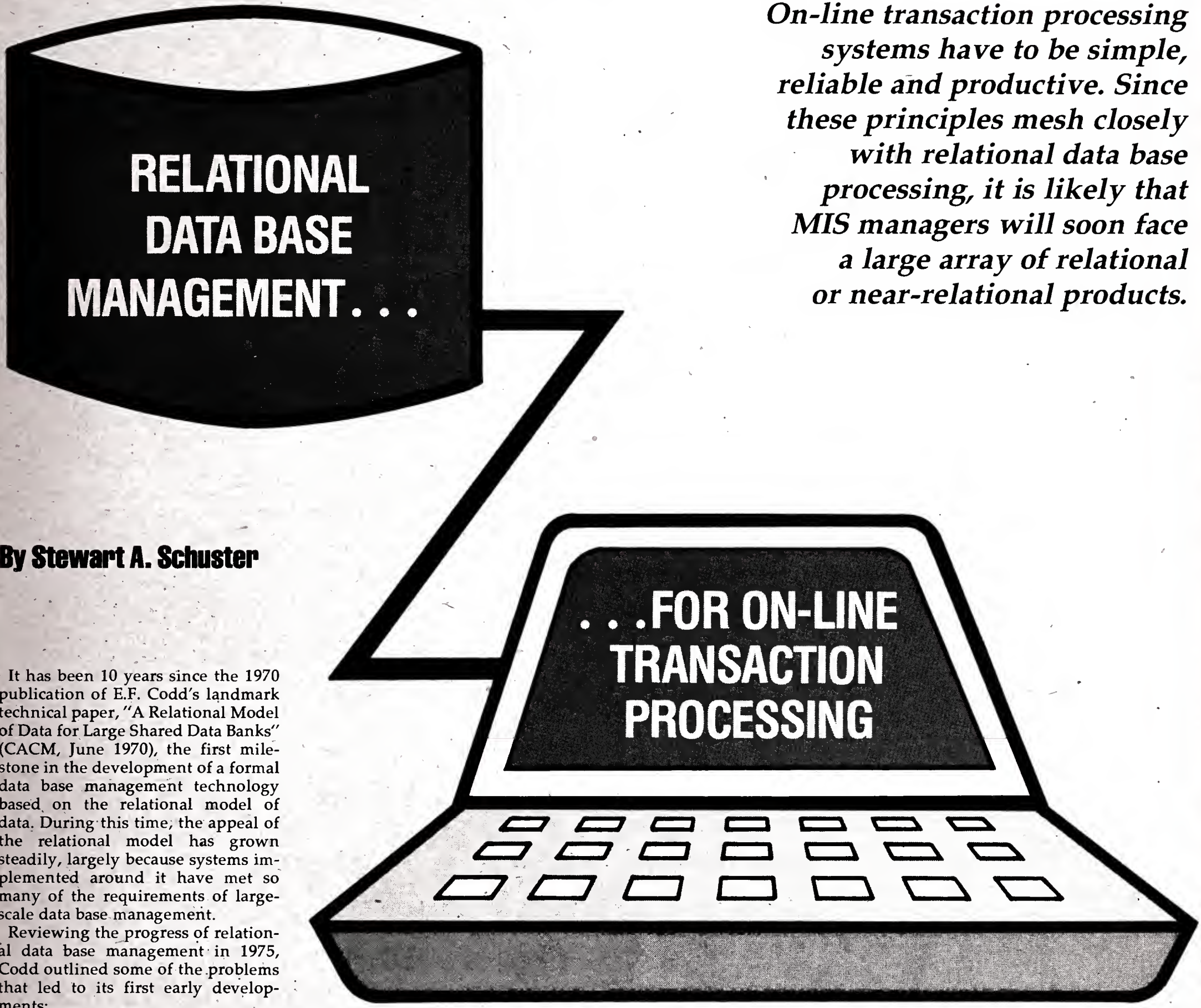
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RELATIONAL DATA BASE MANAGEMENT...

On-line transaction processing systems have to be simple, reliable and productive. Since these principles mesh closely with relational data base processing, it is likely that MIS managers will soon face a large array of relational or near-relational products.

By Stewart A. Schuster

It has been 10 years since the 1970 publication of E.F. Codd's landmark technical paper, "A Relational Model of Data for Large Shared Data Banks" (CACM, June 1970), the first milestone in the development of a formal data base management technology based on the relational model of data. During this time, the appeal of the relational model has grown steadily, largely because systems implemented around it have met so many of the requirements of large-scale data base management.

Reviewing the progress of relational data base management in 1975, Codd outlined some of the problems that led to its first early developments:

"In 1968, it was possible to observe two mutually incompatible trends in formatted data base systems: On the one hand, the tendency of systems designers to expose users of their systems to more and more complicated types of data structure and, on the other hand, the increasing interest in establishing integrated data bases with a much higher degree of data interrelatedness and on-line interactive use by nonprogrammers.

"At about the same time, it was becoming clear that users were spending too much in manpower and money on recording and retesting applications programs which had previously worked satisfactorily, but which had become logically impaired by data base growth or by changes in the stored data representation for various reasons (the so-called data independence problem)."

From "Recent Investigations in Relational Data Base Systems," in Data: Its Use, Organization and

Management; *Proceedings 1975 ACM Pacific Conference, April 1975, pp. 39-43.*

In recent years, growth and change in data bases has nowhere been greater than in on-line transaction processing systems, which involve very large data bases, large volumes of daily on-line updates and extensive terminal-handling facilities. These systems have forced designers to adopt the best engineering principles in putting together systems that are simple, reliable and productive. Since these principles mesh closely with those underlying relational data base processing, it is likely that MIS managers will soon face an increasingly large array of relational or near-relational systems and products.

This article outlines the requirements of on-line transaction processing and indicates how relational data base technology can be applied and implemented to meet those requirements. A major problem with many experimental or early commercially developed relational systems was

their performance in a transaction processing environment. A second purpose of this article, therefore, is to explore organizational and architectural techniques for achieving a functionally complete, high-performance relational data base system and to identify systems that are utilizing these techniques.

A System Taxonomy

Of four basic ways in which data processing systems are used, on-line transaction processing is the fastest growing. The other three are batch processing, time-sharing and real-time processing. These four modes of operation are distinguished from one another by the number of users each supports, whether the users are supported simultaneously, whether large data bases are updated on-line and by the length of time it takes the system to perform an identifiable job on a user's behalf.

• **Batch Processing.** Historically, batch systems were the first to be developed. Because early computing resources were scarce and expensive,

batch systems were designed to do as much as possible in the shortest possible time. With batch systems, turn-around time is typically measured in hours. If a job involves access to a data base, that data base is normally loaded into storage for that job, then unloaded when the job is completed.

• **Time-sharing.** Time-sharing systems grew out of the need to provide programmers and other computer users with more direct access to their machines. The objective of a time-sharing system is to support many users interacting with the system simultaneously via terminals, giving each user's program a "time slice" of several milliseconds in which that program has exclusive use of the central processor. The users — which may number anywhere from a few to 100 or more — may be working independently of one another or they may be working on a common task, such as the programming of another system.

The maximum number of time-sharing users that can be supported

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with reasonable response time is usually less than 100, even on the largest systems. The system's response time for an individual user is highly variable, depending as it does on the number of other users, the nature of the work they are doing and how the system allocates to user programs. Data base sharing is rarely a problem. Time-sharing systems are predominantly used for program development or small applications.

• **Real Time.** Real-time systems attempt to guarantee an appropriate response to a stimulus or request quickly enough to affect the condition that caused the stimulus. In process-control environments, where real-time systems are most frequently used to monitor and control highly automated chemical or manufacturing processes, the needed response time is measured in milliseconds. To provide this kind of response time, most requests are kept simple — e.g., "Turn this switch on" — and the operating systems provide only very basic task management and input/output services, with a minimum of system overhead. Most real-time systems lack any data base management facilities.

• **On-Line Transaction Processing.** On-line transaction processing systems are similar to real-time systems insofar as their goal is to provide a predictable response to a predictable request within an acceptable time. Here, the response time need not be as short as it must be for real-time systems, but it must be shorter and less variable than the response time of a time-sharing system. The reason: The user's (or "operator's") interaction with the computer is normally part of a larger transaction encompassing another person for whom the operator is performing a service, such as making an airline reservation or a money transfer. Response time and throughput as measures of system performance are the primary targets of optimization in transaction systems. They are sought even at the expense of holding some computer resources in reserve for use during periods of heavy loading or in the event of a system malfunction.

Critical Characteristics

On-line transaction processing applications in such areas as banking, insurance, distribution and retailing are typically very large by almost any measure: size of data bases, number

of users, number of data base updates, complexity and volume of processing and even geographical extent (some systems are distributed over international networks). Transaction processing systems are also emerging in electronic mail and office automation applications. Many of these applications are critical to the ongoing, daily operations of financial and commercial enterprises.

On-line transaction processing systems must therefore be capable of high performance (speed, accuracy) as well as be implemented in a way that allows modification and modular growth without interruption of service.

A number of other characteristics distinguish on-line transaction processing systems and impose on them a broad and stringent set of demands. One is that the users may range from highly skilled data processing professionals to management or administrative people who are relatively unsophisticated in the use of computers but whose demands on the system are nevertheless important and must be met. Another is that the number of users and the number of applications are likely to grow.

Taken together, these characteris-

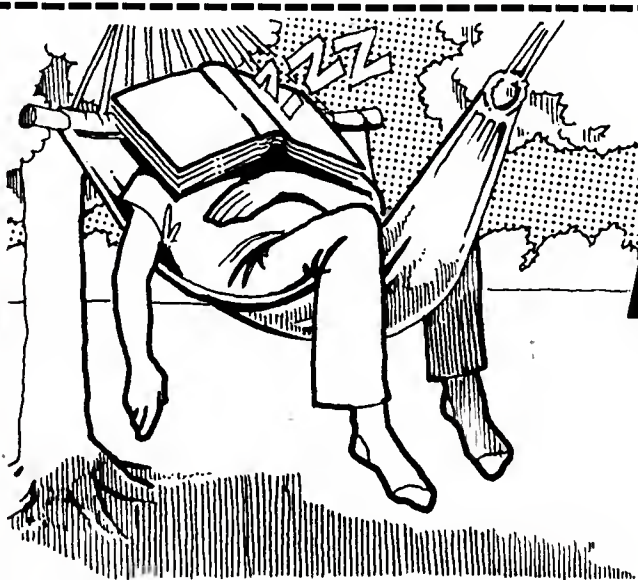
tics dictate that a transaction system support interaction with data bases at several levels of language sophistication and that the system be designed in a way that makes growth and modification easy.

The key components in a transaction processing system are the data base and the data communications facilities. Virtually every transaction involves one or more accesses to the files of a data base, either to retrieve information or to enter new facts into existing files. The availability and reliability of the data base are critical in a transaction system — along with growth, ease of use and performance, they are the primary determinants of system quality.

In addition, the support of a large number and variety of terminal types is mandatory. The trend to computer networking and decentralization requires that data base management systems support distributed data bases.

The critical characteristics of on-line transaction processing systems may be outlined as follows:

• **Modular Growth.** Experience has shown that once an application goes on line, the transaction load often increases to fill the capacity of the orig-



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inal system, requiring an upgrade to a higher performance computer or expansion through distributed processing via a network of systems. It is very difficult to accurately size systems for transaction processing since there are many variables involved. Also, successful systems tend to grow rapidly after initial installation. Hardware and software architectures that facilitate this expansion are required. Often, it must be possible to upgrade and maintain systems without taking them off-line.

- **Continuous Availability.** An on-line system must be continuously available during the hours in which transactions are generated by users. Any failures that bring the system to a halt or compromise data integrity can, and do, result in financial loss or worse. In some applications, such as air traffic control, such a failure may even result in catastrophes.

- **Data Integrity.** Even the most reliable computer hardware eventually fails. When it does, it is essential that it do so in a "soft" manner — that is, without corrupting other components of the system and causing larger, more serious failures. This is particularly true when the system contains large data bases, which must be protected against accidental loss or corruption when a system component fails. When a processor, I/O channel, controller or disk drive fails during a transaction, the entire transaction must either continue to run to completion or be "backed out," leaving the data base in a consistent state. The data base management system must guarantee such behavior over a wide range of possible hardware and software failure conditions.

- **Ease of Use.** Since computers were first commercially applied in the 1950s, computing costs have plummeted. At the same time, personnel and labor costs have risen steadily. As a result, computers are being applied more and more to increase the productivity of people. Indeed, this search for greater productivity is one of the major driving forces behind the movement to on-line systems and the principal reason computers are being used more often by people who have little or no formal computer training. It is essential that these people be provided with a friendly, nonthreatening interface to the data base and processing functions that are meant to assist them in their day-to-day jobs.

On-line applications have been difficult to build. On-line programs tend to be more complex than their batch predecessors. Batch programs typically processed transactions from only a single input stream. On-line applications typically must interact with many terminals at one time, and the details of keeping track of multiple outstanding transactions can be very complex. Development and debugging of these applications can be major bottlenecks in the movement to on-line applications. Operating

system and data base software for the on-line environment must simplify the job of the applications developer, the goal being to make this process as simple as, or simpler than, that of implementing batch applications.

- **Performance.** To be useful in increasing productivity, on-line systems must provide a high level of performance. The primary measure of an on-line system is throughput: how many transactions it can handle in a given time period. This measure

determines the number of simultaneous users who can be supported by a specific hardware configuration for a specific cost. Typically, the system needs to support hundreds of on-line users generating up to a million transactions per day.

Design Implications For Data Base Systems

Only in the past 15 years has the profound importance of data base technology been realized, leading

system designers in both the academic and commercial worlds to focus on the theoretical and practical issues surrounding the implementation of data base-oriented transaction processing systems.

As data base systems have grown in size, diversity and importance, it has become increasingly important to search for ways of accommodating growth in the number and complexity of applications, as well as the mi-

(Continued on In Depth/22)



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(Continued from In Depth/21)

gration to cost-effective hardware, a greater diversity of users and multiple levels and types of access to data bases.

The qualities of a data base system that tend to promote its durability and survivability in the face of these demands must reside not only in the organizational structure of the data base itself, but also in the entire hardware/software structure that contributes to the "total system" de-

sign. Ideally, all of the major components of the system — the underlying hardware architecture, the operating system, the data communications subsystem and the data base management facilities — should reinforce and complement one another to produce a system that meets contemporary data base management requirements.

At the heart of a data base management system is the data model — the organizational scheme that deter-

mines how a data base is to be logically accessed, how easy or difficult it is to use or modify and how stable, or "survivable," it is in an evolving and changing system environment. In the world of transaction processing, as we have seen, these qualities are of critical importance.

Of the three primary data models — the hierarchical, the network and the relational — the relational is the most recent and, consequently, the one that has been developed with

the most contemporary needs of large-scale data base systems users clearly in mind. Data base files in a relational system have three characteristics that distinguish them from files in hierarchical or network-based systems:

1. All records in a relational file have, from the user's point of view, the same structure.

2. Relationships between records are manifested by comparing common field values.

3. Users need not be concerned with how the data is physically accessed or stored.

A fourth characteristic is often added and is sometimes taken, I believe mistakenly, as the sole distinguishing characteristic of relational systems — that all files must be "flat" two-dimensional tabular representations of data. The flat file is certainly a desirable feature for user simplicity and supporting powerful query languages; but to enforce the flat-file structure without exception — for example, without allowing an occasional use of a repeating group or a Cobol "occurs" clause — can detract from system performance or applicability in evolving commercial enterprises where existing Cobol programs must be executed.

The three characteristics above allow a relational data base whose files can be simply viewed as a set of interrelated tables whose rows are records, columns are the data fields and whose records are related through fields having matching data. Although the relational model promotes the use of high-level query languages, the use of such languages should not be confused with the data model. Indeed, one performance enhancement to many current systems is to allow low-level navigational access to relational files.

One primary benefit of a relational data base is that files are logically interdependent, but physically independent. This means that files can grow, that new files can be added and that files can be redistributed over a network without requiring structural changes to related files. All of these things contribute to the growth and performance of a transaction processing system and minimize the changes that must be made to application programs to access the data.

User-Transparent

Another benefit of the relational approach arises from the fact that physical file structures and access methods are transparent to the user — whether the user is a programmer or ad hoc inquirer. User queries and updates can be formulated in user-oriented language that need not and do not reflect the manner in which data is actually stored in a data base.

Since the user language does not need to reflect storage-level data structures, the query-formulation process and the actual data accesses

(Continued on In Depth/24)

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(Continued from In Depth/22)

can be separated into two levels — one logical and one physical. This further enhances a system's capacity for modular growth; it also can be exploited in a distributed network environment, in which the storage-level access processes can be geographically located with the data while the query-formulation processes are located with the users.

Since 1970, nearly 30 relational data base management systems have been

reported in the technical literature. Not all of these systems have actually been implemented. Some have only been designed, and only a few — for example, Tymshare's Magnum, IBM's Query by Example, IBM's DS/SQL, Tandem's Encompass and Relational Software, Inc.'s Oracle — have been developed for commercial application. The others have been developed as research vehicles to support the exploration of high-level, nonprocedural query/update lan-

guages. It is widely believed that the majority of data base management systems of the near future — say, two to three years away — will be relational [CW, July 14, 1980].

A Complete DBMS

What, then, are the requirements for a *complete* data base management system for on-line transaction processing? I have indicated above several characteristics such a system must have. Here I want to stress com-

pleteness from an implementation point of view — from the point of view, say, of a corporate director of data processing, who must provide users with a full range of tools.

Five components must be present in a complete transaction-oriented system:

1. A data dictionary facility, together with a data definition language.
2. Access methods — indexes, alternate keys, etc.
3. Integrity controls, which include concurrency, crash recovery and consistency.
4. Query and report-generation facilities.
5. Terminal and transaction control facilities for screen control, data validation, formatting, transaction initiation and flow control.

1. Data Dictionary/Data Definition Language. A data definition language (DDL) and a data dictionary are central to any data base management system. The portion of a DDL that describes the records and files in a data base is called a schema; a schema is a list of DDL statements that describe record structures, file types and file access methods.

A DDL schema in a source language is compiled to produce, among other things, a data dictionary for the data base it describes. The DDL system may also produce a schema report summarizing record structures, index keys, file-creation commands and data-declaration source code for the host languages supported by the system. The data dictionary is a permanent record of the data base schema, which becomes a system resource providing data base managers with information about how each file is structured and how all files are related to one another.

In addition, the data dictionary should be augmented by a central repository containing descriptions of other system components such as transaction programs, communication lines and devices and users.

2. Access Methods and I/O Architecture. All data base management systems have access methods of some kind. These are the file types such as sequential, relative, indexed and so on; alternate keys, blocking factors, compression and buffering techniques used for efficient access to data stored on disks. Here, the complementary nature of hardware and software is crucial.

The real questions are how efficient the methods are and whether they provide the user with the freedom to view the data independently or how it is stored at the physical level. The most powerful and efficient access methods combine hardware and software strategies to reduce the time required to find the data at its physical location on a storage device.

3. Integrity Controls. A transaction is a series of updates that transforms a data base from one consistent state at time T to a new consistent state at time T'. Once that series of

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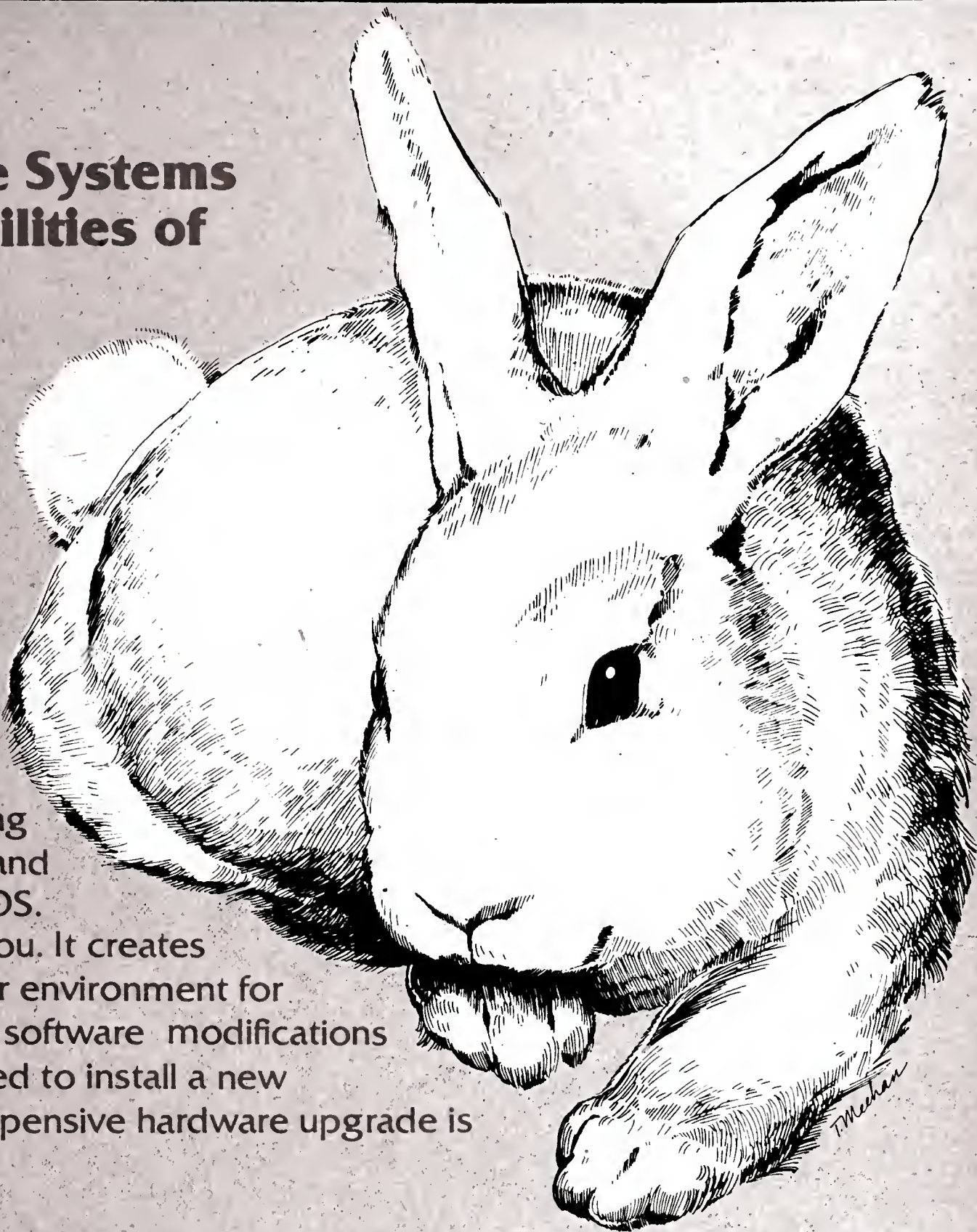
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IN DEPTH

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updates begins, the data base is in an inconsistent state until the series is completed. Consistency control mechanisms such as file/record-level locking ensure either that the system goes to state T' and finishes, leaving the data base consistent in the new state, or that it returns to state T, leaving the data base consistent in the old state.

For a distributed environment, the lock owner must be a transaction

identifier that can span multiple application processes running on more than one system, which may initiate accesses to a number of files on a number of systems. Once the accesses are opened and the locks imposed, the locks must be held until the transaction ends. This avoids cascading transaction backout resulting from transaction aborts caused by application, hardware or data communications failures.

4. Query/Report-Generation Fa-

cilities. Query facilities and report-generation facilities, while often referred to as one and the same, are separate components. This is an important issue in discussing the usefulness of data base management systems, and particularly existing relational systems, for commercial application.

Most relational systems have very rudimentary report generators or none at all. This is not because of any shortsightedness on the part of their

designers, but because, as I pointed out earlier, most of these systems were developed as vehicles for research into higher level query languages. Report generation was not particularly relevant to those investigations. Nevertheless, report-generation facilities are essential in a commercial environment, and a system that does not have them will not be as useful for commercial applications as one that does.

5. Terminal Control Facility. As might be expected, a screen-oriented terminal control facility must be available to capture data and provide operator support in an on-line transaction processing system. Among the requirements of such a system, as we have seen, are large numbers of terminals with screens for different concurrent applications possibly using different protocols and having different requirements for screen displays. One problem this creates is that of translating screen formats into internal system formats and vice versa. In addition, the system may have to sequence through many different screens to assemble and process a transaction.

The architecture of such a system can be contrasted with that of earlier batch processing systems. One of the main advantages of batch systems was that they were simple. Input typically came in on cards, a data base residing on tape or disk was updated and reports were generated. The system read one transaction, did what it requested, produced input for a report and read the next transaction. The system — and, just as important, the programmer who created it — had to worry about only one thing at a time.

In designing and implementing a system for on-line transaction processing, one would like to achieve that same simplicity. The problem is that there are a multitude of terminals on one end, a mass of data on the other and a variety of processes and processors that need to be accessed in between.

The simplicity of a batch system might be achieved here by writing an application program to deal with each terminal or with each type of terminal. That application program could then be replicated as many times as necessary to handle all the terminals, so that there might be 100 copies of the application program running, one to a terminal, against the data base. This would make terminal handling relatively easy, but it would consume system resources at an extraordinary rate. If there were only 10 terminals, this organization might be feasible; if there are hundreds, it is not.

Possible Alternative

An alternative might be to write one program that accepts input from all of the terminals. This program would be multithreaded: it would deal with all the terminals at once,

(Continued on In Depth/30)

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keeping track of what input came from what terminal and which terminals were active or inactive. This scheme has the appealing quality of centralizing control of access to the data base, but is, unlike the other one, extremely complex and does not lend itself to multiple-processor computer architectures or to networking.

Each of these approaches has some advantages and, given an adequate hardware and operating system ar-

chitecture, they can be combined. One approach is to have a multithreaded front-end terminal control program that can interact with multiple terminals, while many different application programs can operate on the data base.

In an order-processing system, for example, one application program will generate purchase orders, while another will update customer accounts. The application of "server" programs can be relatively simple if

the terminal control programs are designed to deal with the complexity of multithreaded processing. It is here that the relational data base structure gives application programmers a distinct advantage by permitting them a simple view of data that can readily accommodate growth of the data base and changes in access paths without programmer intervention. Note, however, that a relational data base structure alone is not sufficient: It must be part of a total system

approach.

There are advantages to separating the screen-control functions from the data base access functions in a distributed processing system. First, it allows for easier control of load balancing, since one may have many invocations of the data base program that does order entry, for example. Second, it simplifies maintenance by permitting changes in the way the screens look without requiring changes in how the corresponding business functions are processed.

Language Levels And Language Support

Since relational systems were originally devised at least in part for the purpose of investigating query and retrieval languages, it is important to understand the notion of "level" of language and what it means in a transaction-oriented environment.

When we speak of "higher level" query or update languages, we mean languages that are nonprocedural and are best suited to dealing with sets of files and records. When we speak of "lower level" languages, we mean those that are procedural, navigational, record-oriented. Statements manipulate individual records of the data file rather than entire sets.

In the early days of relational data base system research, the data management problem being researched was not how to get data into the data base, but how to retrieve data from it — and, in particular, how to retrieve data from it if you did not know exactly how the data was stored. The focus was, therefore, on higher level query languages, to the detriment of lower level data manipulation languages for efficiently traversing data bases. It was partly owing to this neglect that early relational systems acquired a reputation as inefficient.

Over time, and as relational technology has moved into the commercial world, it has become clear that both levels of language are necessary and that most data base management tasks are suited to one level or the other. A single level of language will not suffice, either for efficiency or for user convenience.

One still finds both partisans and objectors in the ongoing discussion accompanying the emergence of relational data base management as a practical, powerful discipline for widespread application in the data processing industry. To the extent that there is still a debate, however, it is growing increasingly narrow in the face of successful implementation and use of large-scale systems.

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Dr. Schuster received his B.S. of applied mathematics and computer science at Washington University in St. Louis, Mo., and his M.S. and Ph.D. in applied statistics and computer science, respectively, at the University of Illinois in Urbana-Champaign.

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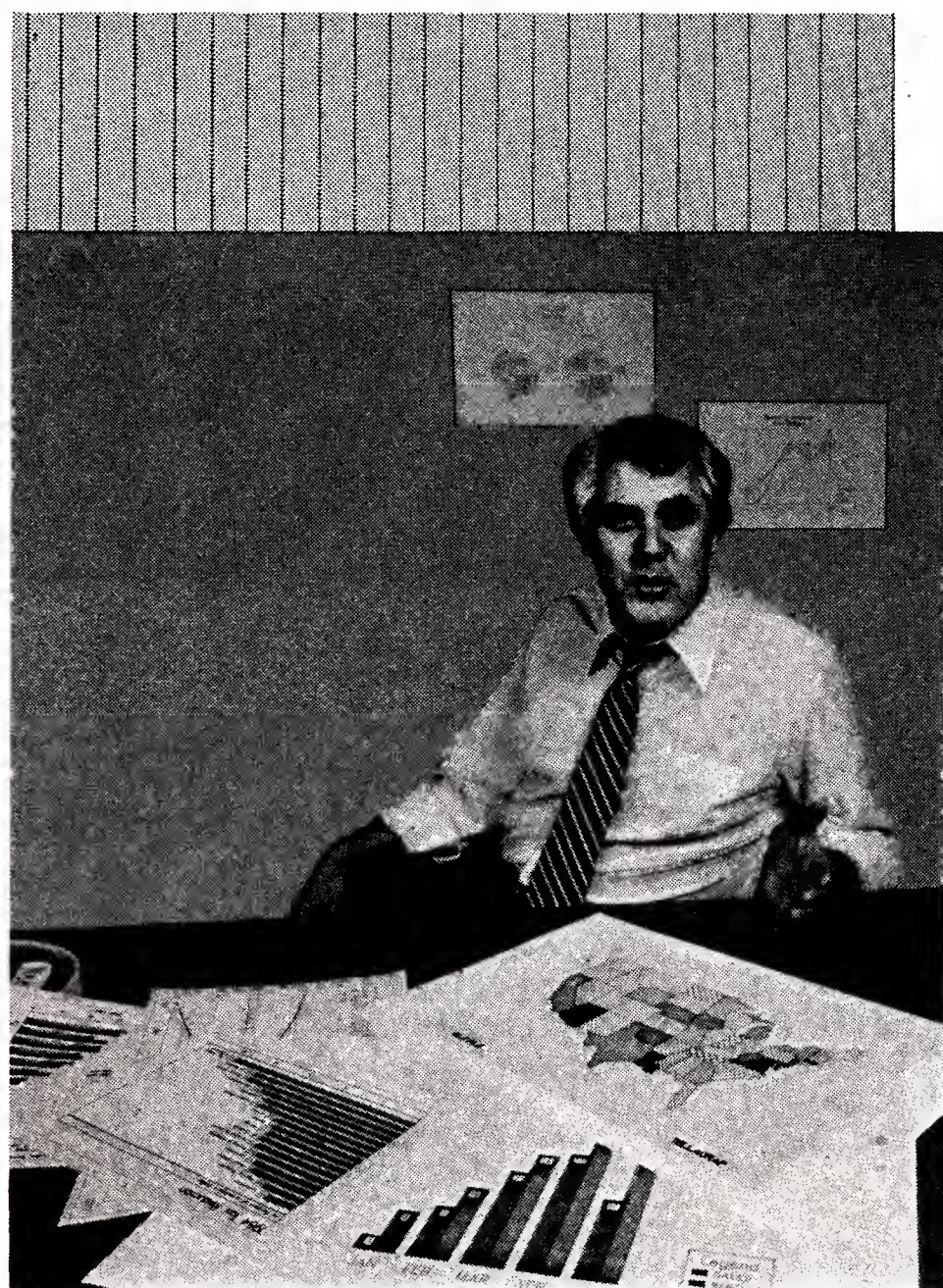
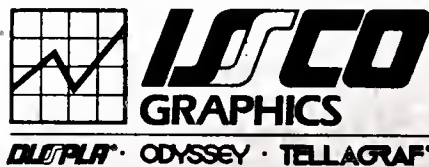
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STRUCTURED MAINTENANCE

New Tools For Old Problems

By David A. Higgins

Over the last few years we have learned a great deal about the creation of more reliable computer software. Indeed, it seems that today we are on the verge of being able to correctly engineer our programs and systems through the use of structured analysis and design techniques.

But even after such a design technology is well understood, widely accepted and consistently applied, much more work will need to be done. Users will have to deal with the question of what to do with all of the software created prior to the existence of the structured methodologies. There is already a huge body of work in place representing literally millions of hours of effort and billions of dollars of investment.

Must we discard our old programs outright and recreate them using state-of-the-art methods? Or can we find some way to apply our current knowledge of structured design methods to the great mass of so-called "unstructured" software we already have? In order to properly answer this question, we will first need to dispel some popular notions concerning programs and structuring and examine some of the problems we face when trying to define the attributes of a good program.

Structured Programs

Can one structure an unstructured program? Depending on how one defines the buzzwords involved, the answer could be either yes or no. It seems we must first decide what the term "structured" means with respect to a program.

We began talking about structured programs in the late 1960s and in the intervening years have applied the term to nearly every new concept that comes along. At times it seems that one is forced to append the word "structured" to the front of a concept in order for people in DP to think it

worthwhile, such as in "structured analysis," "structured design" and "structured walk-throughs."

The problem is, what specifically does someone mean when he uses the term "structured program"? That all depends on who is doing the talking and what time of the day it is. The term has been tossed around so freely that it means many different things to many different people.

For most people in data processing, structured programming is synonymous with a peculiar style of coding

There is only one problem, though. Does it follow that such a program would necessarily be a good one? Do we even know enough about what a good program looks like that we could recognize one if it were to walk up to us on the street and introduce itself?

Two Essentials

After sifting through all of the rhetoric and the personal prejudices that get in the way of such an evaluation, it seems that there are two essential

People unfamiliar with data processing commonly believe the computer programmer's primary task is building new programs. For most programmers today, however, this is not the case. Industry statistics indicate that upward of 75% of all work done by software people is program and system maintenance. The fact of the matter is that resources devoted to maintenance outweigh those devoted to new development by a factor of three to one. Anyone who has been active in DP for any length of time knows that maintenance is a major problem in almost every shop in the world.

programs. When pressed for a definition, many will further describe the phrase by giving a list of attributes to be found in a structured program: no GOTO statements; nested IF statements to reflect different levels of logic; one-entry/one-exit modules of code less than a page long; meaningful data and procedure names and so on.

From this kind of definition we should be able to tell if a particular program is structured simply by inspection. If it has all or most of these features, we will pronounce the program structured and it will receive our blessings; otherwise, we will condemn it to Program Hell for being (gasp) unstructured.

attributes a good program would have to possess. First, it would have to produce correct results reliably when used properly. Second, it would have to be easy to enhance when requirements changed.

Put more simply, a good program should work and be maintainable. The importance of the first attribute is obvious and unarguable, but what about the second? Why should we attach such importance to maintainability in a program?

Consider this for a moment: How long does the average program persist in a system? After all, if most of our programs are of the "one-shot" variety — written for one specific purpose and then immediately dis-

carded — then program maintainability is a moot point and need not be considered. In practice, however, such programs are very few and far between, if not entirely nonexistent. Nearly all of the programs we create hang around for far longer than just a single execution. Most last for a very long time indeed.

There are still thousands of programs in production today that were written in the early 1960s for generations of machines now found mostly in museums. Some of these programs have been translated from their original language into Cobol or PL/I, but they were never really discarded and rewritten. So relatively few programs have ever actually expired that it is hard to say for certain how long the average program's lifetime is. It is not uncommon to find programs that are 10, 20 or more years old.

If a program is going to hang around in a system for a couple of decades, we need to consider the ratio of dollars spent modifying that program over its lifetime to the dollars spent creating it initially. Statistics published in 1978 suggest that for conventional programs that ratio is around two to one (Zelkowitz, M.V., "Perspectives on Software Engineering," ACM Computing Survey, June 1978). At least two-thirds of the dollars invested in a program are invested in its modification; less than a third of a program's cost is in writing it for the very first time.

For future estimates, that ratio is probably low. As we begin to build programs with an eye toward future modification, we may find that our programs last a lot longer than they do now, so that a much bigger percentage of the total investment comes in their enhancement. We may eventually find that upward of 80% or 90% of the total cost of a program comes in adapting it to new re-

(Continued on In Depth/32)

IN DEPTH

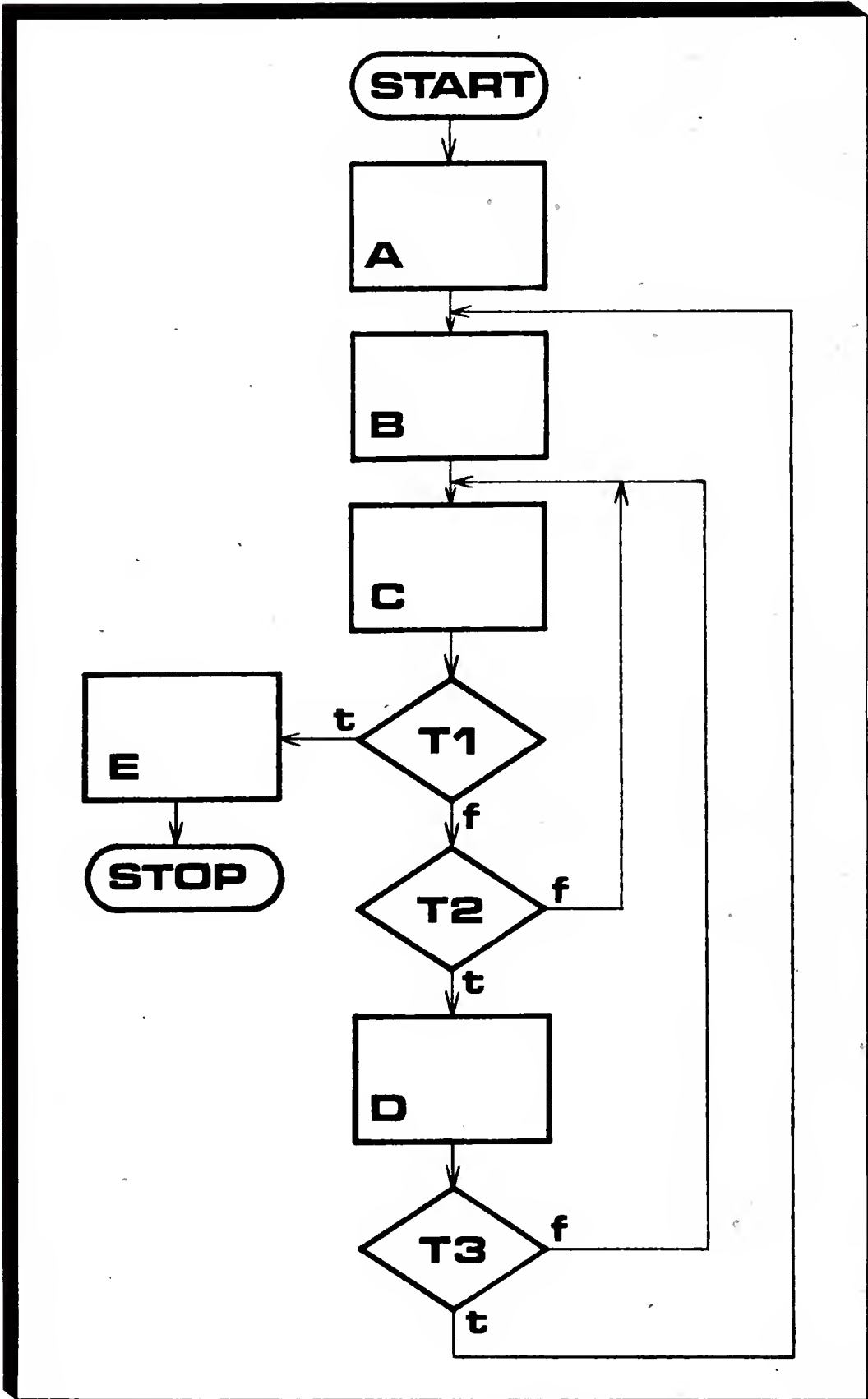


Figure 1. Program Flowchart

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(Continued from In Depth/31) requirements.

Building modifiability into programs is crucial to our long-term productivity. As a matter of fact, a lack of modifiability has caused us to label a lot of our existing software as unacceptable. It isn't that our old programs do not work (although it is sometimes hard to tell why they do), but they are difficult if not downright impossible for the average human being to modify. Consequently, we have saddled these programs with the distinction of being unstructured and have made up our minds that we should get rid of them somehow.

Actually, the term "unstructured" is a misnomer. All programs have some structure, although it may not be discernible or may not be the one we want.

Just how does one go about getting rid of a program that cannot be easily maintained, short of pitching it out a window? Is there some method we can use to transform a program that is not currently modifiable into one that is?

One way people have tried to approach this question is by asking what features make for a bad program. We can examine bad programs (there are certainly enough of them available) and identify the different characteristics that seem to make the program hard to change. This would seem at first blush to be a reasonable and logical approach to solving the problem, but it is not. It ultimately will lead us into a subtle trap from which it may be difficult to escape.

Bad Programs

When looking at any given bad program, one is apt to notice many features that apparently hinder the maintenance effort. One of the most obvious hindrances is the presence of nonsense or misleading names in the code (some people have even asserted that using misleading names is an excellent security device for code). An otherwise well-organized and well-designed program is rendered useless by the use of poor names. The conclusion we draw: Programs are made more maintainable by using meaningful data and procedure names.

Another apparent problem with bad code was pointed out by Edsger Dijkstra in a much quoted (and much misunderstood) article about branching in a program ("Structure of the Multi-Programming System," *Communications of the ACM*, May 1968). It seems that Dijkstra noticed that programs containing a lot of GOTO statements were harder to maintain than those that did not. From this observation, many people drew the conclusion that programs should be created with few or no GOTO statements and that already-existing programs can be made more maintainable if their GOTO statements are removed.

Unfortunately, this conclusion is

faulty, and reliance upon it can generate some weird results.

The Nasty GOTO

Does the use of the GOTO statement introduce irreparable damage to the maintainability of a program? Is its use so disastrous that we should try to eliminate it wherever it occurs? Many people have asserted that we should. But before we pass final judgment, let us do some investigation.

Assume for the moment that the GOTO statement is a bad influence and that we don't want any of them hanging around in our programs. One way we could evaluate their effect on program maintainability would be to remove the GOTOs from a program and determine firsthand if any improvement was noted. In doing this exercise, we will find out two things: In practice it is often quite difficult to remove GOTOs from existing code, and even when you do, it doesn't help very much.

Consider the following Cobol Procedure Division:

```
PROCEDURE DIVISION.  
OPEN-FILES.  
  OPEN INPUT CUSTOMER-FILE, OUTPUT  
  PRINT-FILE.  
PAGE-HEADING.  
  MOVE TITLE-LINE TO PRINT-LINE.  
  WRITE PRINT-LINE AFTER ADVANCING TOP-  
  OF-PAGE.  
  MOVE HEADING-LINE-1 TO PRINT-LINE.  
  WRITE PRINT-LINE AFTER ADVANCING 2  
  LINES.  
  MOVE HEADING-LINE-2 TO PRINT-LINE.  
  WRITE PRINT-LINE AFTER ADVANCING 1  
  LINES.  
  MOVE ZERO TO LINE-COUNTER.  
MAINLINE.  
  READ CUSTOMER-FILE  
  AT END GO TO TERMINATE.  
  IF CUSTOMER-VOLUME > 1000.0  
    THEN GO TO PRINT-A-LINE.  
  GO TO MAINLINE.  
PRINT-A-LINE.  
  MOVE SPACES TO PRINT-LINE.  
  ADD CUSTOMER-VOLUME TO TOTAL-VOL-  
  UME.  
  ADD 1 TO CUSTOMER-COUNT.  
  MOVE CUSTOMER-NUMBER TO CUSTOMER-  
  NUMBER-OUT.  
  MOVE CUSTOMER-NAME TO CUSTOMER-  
  NAME-OUT.  
  MOVE CUSTOMER-VOLUME TO CUSTOMER-  
  VOLUME-OUT.  
  WRITE PRINT-LINE AFTER ADVANCING 1  
  LINES.  
  ADD 1 TO LINE-COUNTER.  
  IF LINE-COUNTER > 55  
    GO TO PAGE-HEADING.  
  GO TO MAINLINE.  
TERMINATE.  
  MOVE TOTAL-VOLUME TO TOTAL-VOLUME-  
  OUT.  
  MOVE CUSTOMER-COUNT TO MAJOR-  
  COUNT-OUT.  
  MOVE TOTAL-LINE TO PRINT-LINE.  
  WRITE PRINT-LINE AFTER ADVANCING 2  
  LINES.  
  CLOSE CUSTOMER-FILE, PRINT-FILE.  
  GOBACK.
```

This is by intent a very simple program that we can understand easily as it is. Since it is so simple we should be able to evaluate whether any real improvement (or degradation) is made by removing the GOTO statements in it. Now all we have to do is figure out how to take the GOTOs out of an existing program. Since GOTOs deal with the transfer

of control in a program, the first step we will take involves the separation of the control statements in the code from the detail statements. The control statements include all of the tests (including the AT END and the INVALID KEY clauses of the READ and WRITE statements), the branches (both conditional and unconditional) and the targets of the branches (the paragraph and section names). The detail statements are those that perform some elemental task such as READ, WRITE, OPEN, CLOSE, MOVE and the arithmetic expressions and do not participate in program control.

In doing this, it becomes obvious that the program consists of five separate blocks or sections of detail code. Each section has only one entrance point, one exit point and contains only sequential processing within; thus, each detail block fits the classic definition for the term "code module." Since the entire module is executed from top to bottom each time it is invoked, we will not need to examine the interior of the modules any further. For our purposes here, we will consider that this program consists of five indivisible units held together by the control structure.

Since the five detail blocks can be treated as single units, we can boil the program down to a pseudocode skeleton:

Procedure Division.
Open Files.
BLOCK A
Page-Heading.
BLOCK B
Mainline.
BLOCK C
At End Go To Terminate.
If Customer-Volume > 1000.0
Then Go To Print-A-Line.
Go To Mainline.
Print-A-Line.
BLOCK D
If Line-Counter > 55
Then Go To Page-Heading.
Go To Mainline.
Terminate.
BLOCK E
Goback.

Since the control structure is so easy to find now, we can begin to translate this program into a more graphic representation form. It is but a short step from the skeleton program to a conventional program flowchart, such as the one shown in Figure 1. The flowchart is the classic method of diagrammatically representing program logic.

And, as flowcharts go, this one is simple enough. Unfortunately we won't be able to use this kind of diagram to accomplish our immediate goal. This charting form cannot usually tell us how we can rebuild our program without any GOTO statements. For that we must employ a more organized diagramming form — one that is far more restrictive in terms of allowable logic constructs. In this case we will use the Warnier/Orr diagram.

With a little effort, this flowchart can be represented as a Warnier/Orr

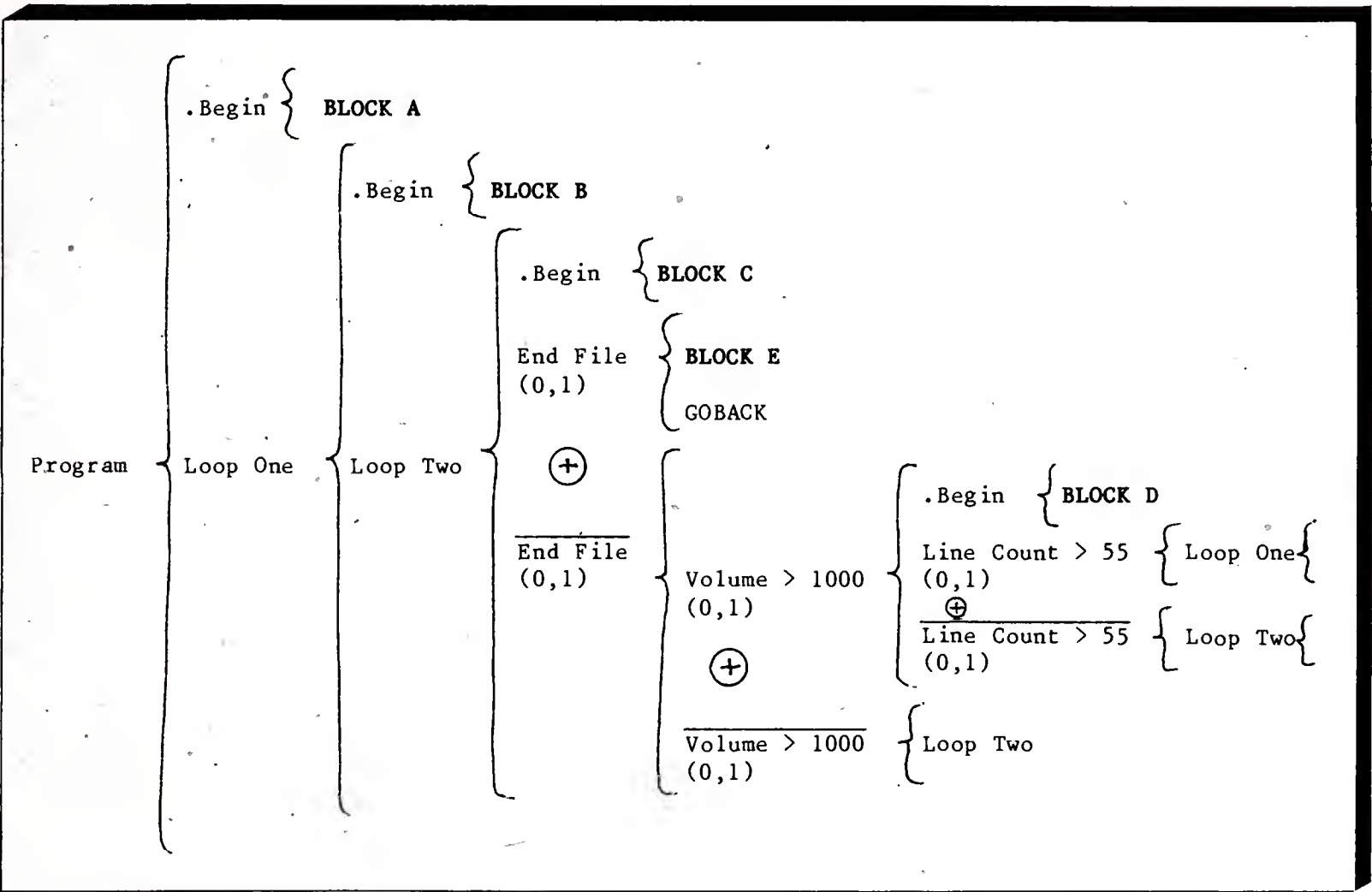


Figure 2. First Draft Warnier/Orr Diagram

diagram as shown in Figure 2.

In Figure 2 we have shown that the first module, BLOCK A, of the program is executed at the beginning of the program. BLOCK B is executed at the beginning of the section we have called Loop One. BLOCK C is executed at the beginning of the section labeled Loop Two. Within this second loop there is a test to see if the input file is at end or not. When the end of the file is encountered, BLOCK E is executed and the program ends.

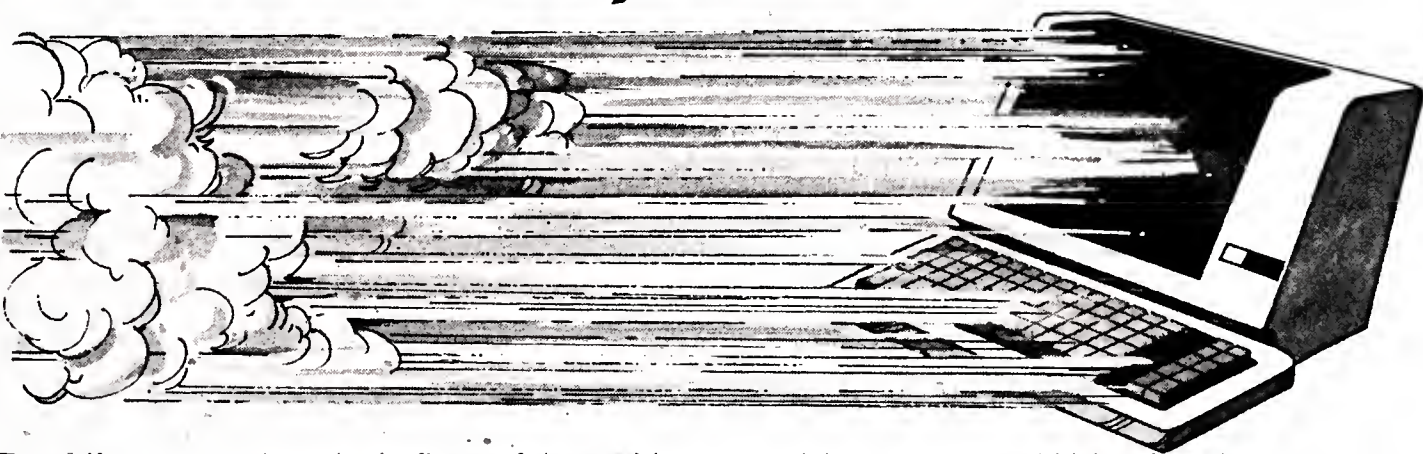
When the file is not at end, a test is made to see if the customer volume exceeds 1,000. When the volume exceeds 1,000, BLOCK D is executed, followed by a test to see if the Line Counter has exceeded 55. When the counter exceeds 55, the Loop One section of the diagram is invoked again. When the counter is not greater than 55 and when the volume is not greater than 1,000, Loop Two is invoked again. This completes the description of the program's logic.

(Just as a side note on this diagram: the three dashed brackets on the right side of this chart indicate that the procedures defined at that point are recursive — that is, Loop One and Loop Two call themselves from within themselves.)

This diagram, if our language allowed such constructs, would enable us to recode our program without using GOTOS. Such a program would look something like the following:

(Continued on In Depth/34)

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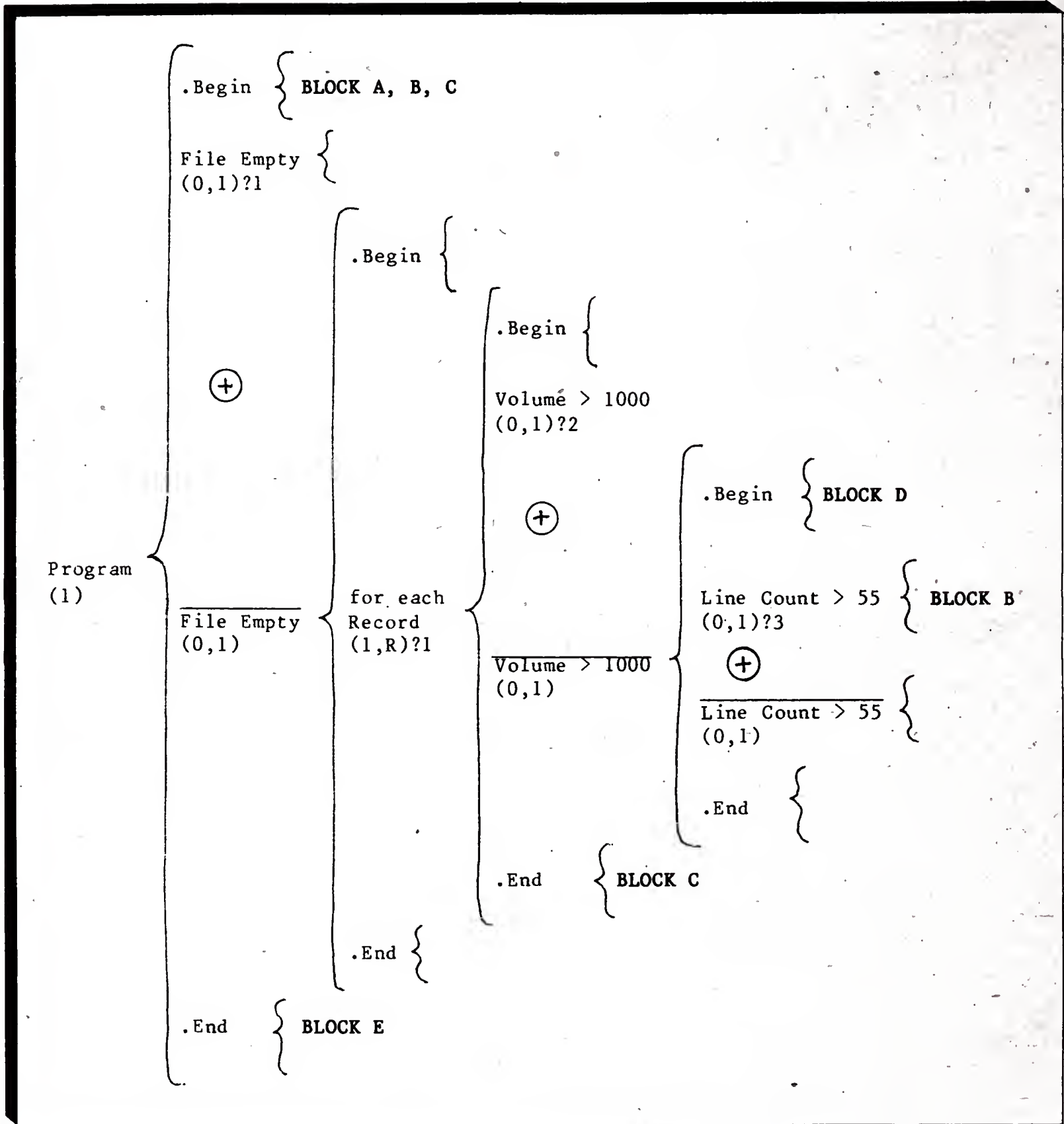


Figure 3. Warnier/Orr Diagram of Program

paragraph from within itself is frowned upon. Therefore, Cobol will not recognize the recursive subroutine calls to Loop One and Loop Two that we have shown here. We must reorganize our diagram somewhat to transform the recursive structures into repetitive structures. The diagram that results from this transformation is presented without explanation in Figure 3. Notice that we set up an "end of file" switch to facilitate correct termination of the loops.

This diagram can be coded into most versions of Cobol without any difficulty. We simply make each bracket on the diagram into a separate paragraph of code and then use the PERFORM ..., the PERFORM ... UNTIL ... and the IF ... THEN ... ELSE ... constructs to implement the logical structures of hierarchy, repetition and alternation, respectively.

The resulting code is operationally equivalent to the program code we began with, only in this incarnation it has no GOTO statements in its logic. Most everyone you might ask would tell you that the new version is indeed a structured program.

But is it a better program? Is it a more modifiable piece of code? Probably not, but not for the reasons one might immediately suspect.

In evaluating this new program, one is greatly tempted to find fault with all of the "extras" the program has acquired in the transition. It appears that this version has taken on a whole cartful of excess baggage where there was none before. First, the new version is physically much larger than the original: more than a third larger in terms of number of lines of code present. Second, an end-of-file switch has been added to control the loops where there was none before.

Third, the use of the PERFORM statement to invoke subroutines is objectionable to many. The PERFORM has a long and distinguished history of persecution for high program overhead, even though today such fears are groundless. However, many people would still argue that it is silly to PERFORM a paragraph when an in-line module would work just as well.

Perhaps worst of all, though, the new version seems to have become badly fragmented in the transition. With all of the PERFORMing going on, it would appear that it is harder for someone to pick up and read than the original. For a program of any size, we would be constantly flipping back and forth, trying to find and keep track of things.

But even if we do not accept the aforementioned complaints as valid and in fact believe the new version of the code to be improved, we still have some serious philosophical problems to contend with. The language constructs we used to implement the Warnier/Orr diagram are specific to Cobol and a handful of other high-level languages like PL/I

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(Continued from In Depth/33)
PROCEDURE DIVISION.
PROGRAM-PROCESS.
PERFORM BLOCK-A.
PERFORM LOOP-ONE.
LOOP ONE.
PERFORM BLOCK-B.
PERFORM LOOP-TWO.
LOOP TWO.
PERFORM BLOCK-C.
IF FILE-END-SWITCH = TRUE
THEN PERFORM END-FILE
ELSE PERFORM NOT-END-FILE.
END-FILE.
PERFORM BLOCK-E.
GOBACK.
NOT-END-FILE.
IF CUSTOMER-VOLUME > 1000.0
THEN PERFORM VOLUME-EXCEEDS-1000
ELSE PERFORM LOOP-TWO.
VOLUME-EXCEEDS-1000.
PERFORM BLOCK-D.
IF LINE-COUNTER > 55
THEN PERFORM LOOP-ONE
ELSE PERFORM LOOP-TWO.
.

Unfortunately, most versions of Cobol will not accept this version of the program as valid; PERFORMing a

and Pascal and are features not even available in many versions of Fortran, Basic, Assembler and RPG.

Does this mean that structured programming is a concept that applies only to a few high-level languages? If so, it would naturally follow that those unfortunate enough to be stuck with some other unstructured language are condemned to repeat the mistakes of the past and can never even hope to build quality software.

But wait one minute. Something about that last conclusion seems contrary to normal experience. Many people have built and continue to build quality software in all kinds of languages, even the so-called unstructured ones. How did we end up reaching a conclusion that is contrary to established fact?

False Assumption

We wandered off on the wrong track because the assumption with which we began — that programs without GOTOs are better — is not correct. One passage of code cannot be said to be any better than another simply because it is written in a different style. That is akin to asserting that Steinbeck's novels are inherently better than Hemingway's: an assertion impossible to support with objective facts. The truth of the matter is that code without GOTOs is not automatically better than code with them.

How does one get drawn into a discussion of the relative merits of the GOTO statement in the first place? Well, it was all innocent enough to begin with. In his article, Dijkstra observed that natively good programs have fewer GOTOs than natively bad ones — this is true. But the conclusion that GOTOs are a problem is not valid: excessive GOTOs are a symptom — a symptom of poor program design. It is no wonder that removing the GOTOs doesn't help. Even though we have removed the obvious symptoms, we have not done a thing to improve the underlying design of the bad program.

However, having represented this program in a well-organized diagramming form, we now have more information about the underlying structure of both the old and new versions of the code. If the Warnier/Orr diagram is easy to understand and to modify, then either version of the code could be more easily enhanced. The diagram that one creates from an old program, though, often has its own problems. Will this diagram tell us anything significant about the nature of the old program, or will it tell us much of anything at all?

For very poorly written and poorly documented programs, this kind of Warnier/Orr diagram is quite often useful for understanding the location and nature of code functions. For most normal applications, however, it is usually less than completely helpful. The fault lies not with the diagramming form, but with the

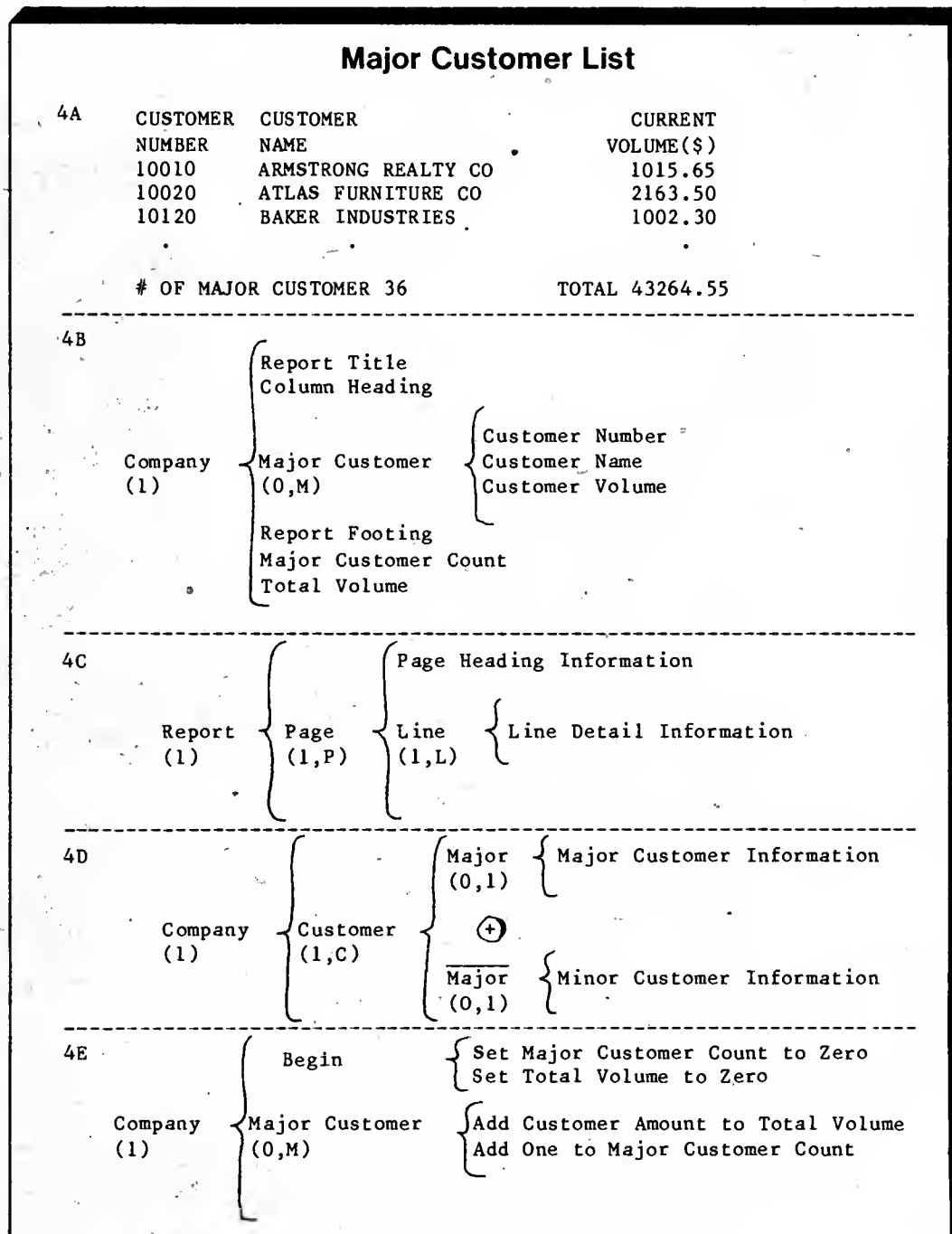


Figure 4. Program Data Structures

kind of structure that is typically discerned.

Curious Findings

All programs can be represented using the Warnier/Orr diagramming form; likewise, all data sets. It turns out that some curious results begin to emerge when one investigates the relationship between data structures and program structures. Such an investigation was done independently by Jean-Dominique Warnier in France and Michael Jackson in England during the late 1960s and early 1970s. Warnier and Jackson used different graphic forms of representing data and process, but both came to the same conclusion: They found that the structures of the "good" programs, the ones that were the easiest to understand and modify, closely resembled the structures of the data sets on which they operated.

Consequently, Warnier and Jackson began to recommend that people create data-structured programs, as opposed to plain old vanilla structured programs, to improve program quality. Indeed, the code created in this fashion was better. It was easier to get running and to modify when requirements changed. Many programmers even found that they could write programs that would run correctly on the very first try.

It was not, though, a different cod-

ing style that enabled them to achieve that success. Two things were responsible: 1) the techniques

imposed a consistent program design strategy and 2) people had to create a good, data-structured design before they could create code.

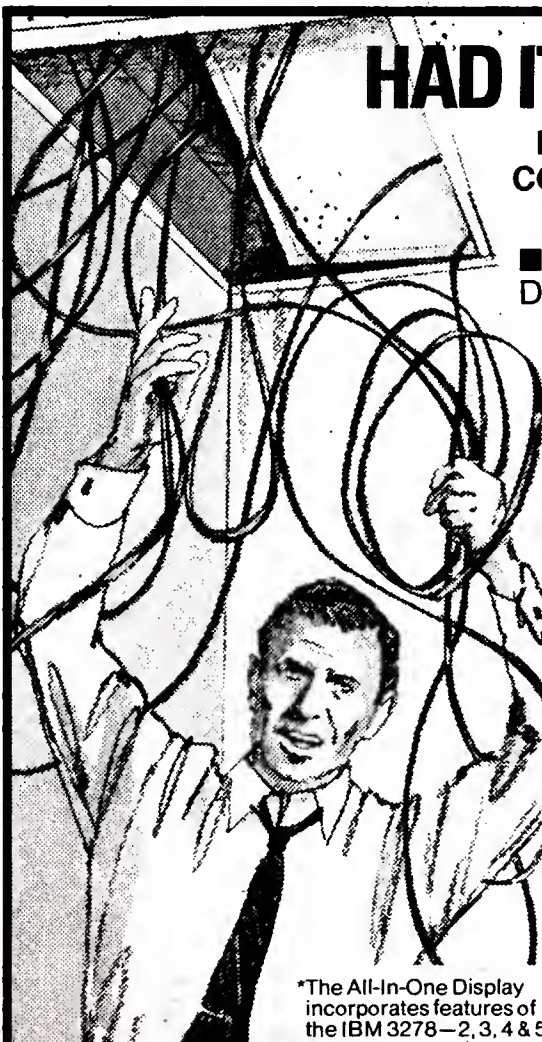
This realization is all well and good for the creation of new software, but it presents some drawbacks when one begins to consider existing software. Programs, unfortunately, do not just have one data structure to contend with. Every program has four data structures buried somewhere in the logic of the code.

The first and most obvious data structure one finds comes not from the program, but from the output it produces, shown here in Figure 4A. It is called the logical output file (LOF) by Warnier, or the logical output structure (LOS) by Kenneth T. Orr, the American researcher primarily responsible for importing and refining the data-structured design methods. This structure is referred to as being "logical" because it is a hardware- and language-independent view of the output requirements.

The LOS for the program we have been considering is given in Figure 4B. It indicates that this output for the company will contain a report title and column headings at its beginning, followed by from zero to many major customer information sets; followed by a report footing, a major customer count and a total volume at its end. For each major customer found on the output, we will find a customer number, a customer name and a customer volume.

Physical Output Structure

In addition to this logical view of the output, there is a physical output (Continued on In Depth/38)



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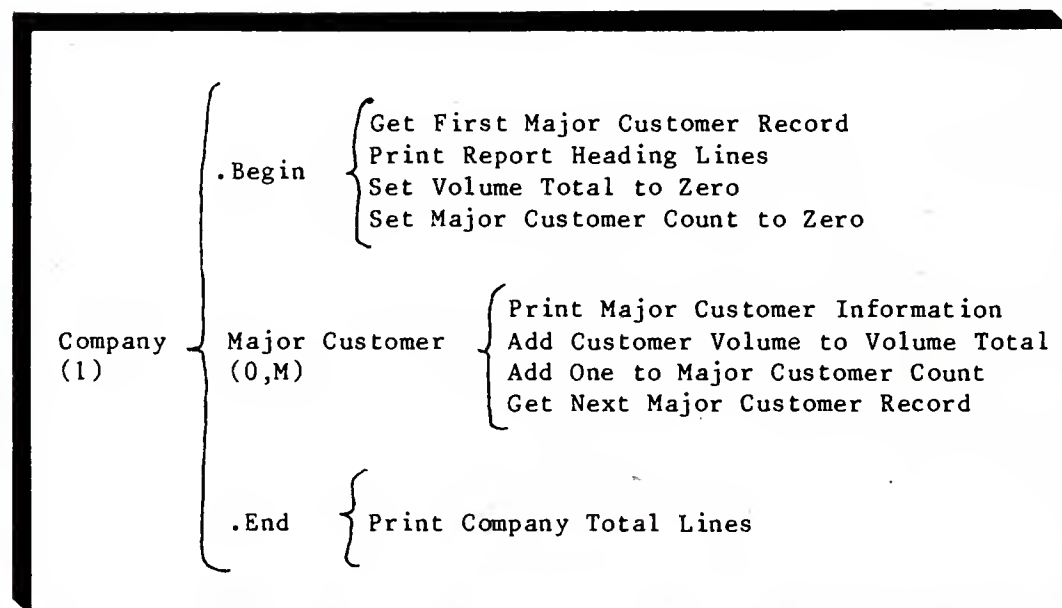


Figure 5. Logical Process Structure

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(Continued from In Depth/35)

structure as well, which tends to be much the same for most printed outputs. It is shown in Figure 4C and simply indicates that the physical output is known as a report, which is composed of pages composed of lines.

Aside from the output structures, there is the structure of the physical input file to be considered. It is given in Figure 4D. This physical input structure indicates that the input file for this application contains a number of customer records, each one of which either is or is not a record for a major customer.

The last structure to consider is one that can be characterized as the physical algorithm structure. In this example, as in most normal applications, the structure is very similar to the LOS found earlier. It is shown in Figure 4E. For some applications, however, this structure can become the most complex of the four. Consider, for instance, the structure of the algorithm for the calculation of the net pay field on the average paycheck.

Data Structures and Old Programs

The realization that every program must contain all four of these data structures embedded in its logic is a significant one. But, as was mentioned earlier, applying this knowledge is at least an order of magnitude more difficult when dealing with existing programs than it is with new ones.

When creating new software, one can easily devise coding mechanisms that isolate these four structures from one another, thus limiting the impact of change when it occurs.

This can be done either by creating separate job steps or by creating a series of partitioned coroutines.

Using the first method, one creates a three-step procedure. First the major customers are selected from the customer file. Second, the selected file of major customers is read in and processed to produce an internal file of detail print lines. Third, the internal file of print lines is processed and formatted into pages and lines on a printer.

The advantage to this method is its simplicity: The different structures are isolated from one another in the program and each step is quite small. The disadvantage, of course, is time. This kind of program must make three passes at essentially the same data, thus increasing the execution time and the I/O overhead by a factor of around three.

The second method of implementation is the one generally preferred. In this approach, the LOS is the dominant structure in the program, and the structures of the physical input and physical output are reflected in input and output coroutines (which are usually coded as subroutines or subprograms). These routines allow the main program to ignore the fact that the real input and output files are less than ideal. This kind of program is derived from the LOS and the calculation structure and is shown in Figure 5. It is called a logical process structure (LPS).

This diagram can be easily augmented with code-level details specific to the particular physical environment in which it will operate. With this approach, the Get and the Print instructions indicated are not simple reads and writes. They are entire subroutines that do as much physical I/O as is necessary to respond to the physical input and output environment.

Thus, the main program believes it is reading from a file that contains only and all the records it needs in precisely the order in which it expects them and is printing on an infinitely long sheet of paper. Again, this method of implementation allows us to maintain the program easily. If the input file structures change, the only modification required is one to the input coroutine and so on.

The program that would be created from such a design has some odd features: It has no GOTOs or nested IFs and is modular, loosely coupled and highly cohesive. In fact, it has all of the attributes that are normally associated with a structured program. Code created from such designs always will.

Structured Maintenance

The aforementioned design method works well for creating good programs, but we must still find some way to apply it to old code. We have already observed that taking the GOTOs out of an old program does not

(Continued on In Depth/40)

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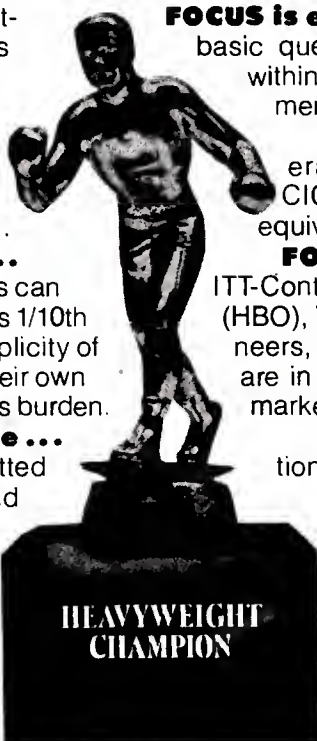
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IN DEPTH

(Continued from In Depth/38)

significantly improve its maintainability and will not result in a program such as the one just described.

Having discussed data-structured design and structured coding techniques, we are ready to make two rather radical statements concerning software maintenance:

- Programs cannot be made more maintainable by simply changing their code.

This assertion must be accompanied by an equally strange-sounding one.

- No program is maintainable unless it is accompanied by a data-structured design.

We in data processing have known something fundamental about the relationship between good programs and sound designs for a long time. Many of us, though, have tried to ignore the problem with the hope that it would go away if we could just get

better languages or better debugging tools. Code, by itself, can never be adequately maintained, only changed. Only designs created with a reliable and consistent strategy can be reliably enhanced to meet the new requirements.

Two Choices

Thus we are left with only two alternatives for old programs: We must either try to resurrect the design for an existing program, or we must create a good design and reorganize the code around it.

It has become obvious through analyzing many different programs in many different languages that a magical "structure analyzer," which would take old code and generate from it a new structured program and a set of comprehensive documentation, cannot exist as such. Such a Rosetta Stone has been sought for years, and only recently have we come to realize that even if you can mechanically generate the structure of a bad program, all you get is a picture of the mess that is there. You do not get a picture of the design that is supposed to be there. Such diagrams are relatively uninteresting and typically not very useful for maintenance.

On the other hand, if one invests the time to detail the four data structures that we mentioned — the structures of the logical output, physical output, physical input and physical calculations — one can learn a great deal about what an old program is supposed to be doing. Understanding a program then becomes a matter of going into the existing code to find out where and how it does the things you know it has to, and modification is then a matter of redesign. Of course, for large programs or for programs with multiple outputs, this procedure may well be incremental, with only small sections of the code being investigated at any one sitting.

Managing Maintenance

Unfortunately, any bifurcated system that separates design from code has some inherent difficulties. In the day-to-day press of trying to get things done, many programmers understate the importance of maintaining the design before the code.

This attitude is often reinforced by management and users. When constantly barraged with speeches concerning the shortage of resources and the enormous backlog of work to be done, programmers and analysts get the idea that their primary concern should be program code and not some silly design documents that don't do anything. In some places this practice is mandated by shop standard. Programmers are told they must develop code first and design documents later. This management attitude has been characterized as the Wisc (Why Isn't Sammy Coding?) syndrome.

Stressing the maintenance of code before design is confusing motion

with progress. It is an extremely short-sighted approach that has already proved to be disastrous in the long run. It is also an attitude that must be overcome somehow if we are ever to make any progress toward controlling the maintenance problem.

When you think about it, it seems somehow odd that such an attitude ever developed. After all, computer hardware is designed before it is constructed, and the design is of different stuff than the construction. Schematic diagrams and logic diagrams are used to describe the electronics design and are checked and rechecked for correctness before the first components are wired together. Separating design from construction is a technique found in every other engineering profession, and it is based on one fundamental observation: Paper changes are cheap.

A similar attitude must be fostered in the minds of software people as well. Until technicians, managers and DP users realize that the languages and the coding styles are not the real problem, we are not going to make any headway toward the goal of improving the maintenance problem.

Maintenance will not go away. As long as the real world is dynamic, our software systems must continue to respond to changing user requirements. It is by definition impossible to build software systems that anticipate and automatically provide for requirements changes. Such systems would consume infinite resources. The best we can do is build systems that are easy to enhance when change occurs and to make a long-term commitment to having a data-structured design for every piece of software we keep. This obviously will not happen overnight, nor will it be cheap. And, I'm sorry to say, there are no panaceas.

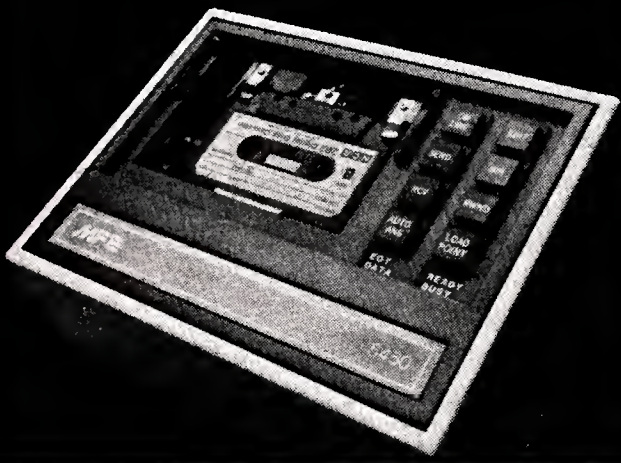
It has taken many years for some of our software to degrade to the extent that it has, and we should not be too surprised to find that it takes us almost as long to correct the problem. Just as losing weight is not an overnight prospect, making software that isn't maintainable into software that is will take some time and require adjusting some old habits. The alternative, however, is to keep doing maintenance the same old way, effectively digging ourselves deeper into the hole in which we are already standing.

David A. Higgins is president of Educo Corp. in Arvada, Colo.

He has been involved with the development of software design strategies since the mid-1970s, working closely with Kenneth Orr and others on the structured systems design methodology.

Higgins, publisher of "Software Maintenance Techniques," a quarterly technical newsletter, writes, lectures and consults on the Warnier/Orr methods in collaboration with Ken Orr & Associates, Inc.

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Bits & Pieces

Dot Matrix Printer Features Five Paper Drive Combinations

WEBB CITY, Mo. — Cardinal Scale Manufacturing Co. has unveiled a high-speed dot matrix printer featuring five paper drive combinations, top-of-bottom paper feed and independently programmable dual-tractor drive.

The Model 2170's bottom ticket feed makes immediate access to the last printed form possible. Other features include 200 char./sec bidirectional printing and built-in diagnostics.

The basic model costs \$2,350, the vendor said. Cardinal may be reached through P.O. Box 151, Webb City, Mo. 64870.

Power Control Device Protects Systems From Voltage Transfers

SAN JOSE, Calif. — A power surge control device designed to protect entire electronic systems has been announced by RKS Enterprises, Inc.

The SS-120-M is equipped with six receptacles to protect computers or microprocessor-controlled systems from voltage transients, the company said.

The SS-120-M power-control device is priced at \$112 from RKS Enterprises, Inc., 643 S. Sixth St., San Jose, Calif. 95112.

Controllers Reportedly Halt Over-Voltage Condition Errors

SAN DIEGO, Calif. — Two computer power controllers that reportedly reduce the number of error halts caused by large starting inrush currents and also provide system protection from over-voltage conditions has been introduced by the Donald C. Harder Co.

The Load Ramp Control provides a gradual and stepless application of voltage when turning the system on, the firm said.

Prices start at \$1,750 for 15A, 208V, three-phase, 400 Hz systems. The firm is at 2580 K St., San Diego, Calif. 92102.

Conditioner Cuts Shutdowns Caused by Inconsistent Power

LOS ANGELES — A low-noise computer power conditioner called Whisperpac, developed to eliminate unscheduled shutdowns, outputting errors, information losses, equipment damage and downtime costs caused by inconsistent power, is being offered by Computer Power Products, a division of Sweinhart Electric Co., Inc.

The Whisperpac has been designed as a 60Hz energy efficient synchronous motor generator for minicomputers requiring 12K- to 50K VA and features digital display, work space and low-noise fans.

The Whisperpac provides up to 500 msec ridethrough. Prices for the 60 Hz units start at \$17,000 from the firm at 2900 E. Olympic Blvd., Los Angeles, Calif. 90023.

Chicago Exchange: Chaos Tied Into Neat DP Package

By Bruce Hoard
CW Staff

CHICAGO — The place is madness. It is a floor show of commerce, filled with shouting, gesticulating traders and ringed by a band of electronic reader boards detailing up-to-the-minute prices for hog's bellies, soy beans and live cattle. On either end are the terminal-clad stations of the more than 120 firms that trade here daily.

The place is the Chicago Mercantile Exchange. And although it may all appear crazy from the glassed-in visitor's gallery, the DP department that manages the thousands of daily transactions here ties the whole show up into one neat package every night.

Some 45 programmers, analysts, operators and supervisors in Chicago and New York are involved, according to operations manager Bob Becker. Two IBM 4341s running under DOS/VS and drawing data from 10 Model 3340 disk drives are at the heart of the system. Three Series/1 units are used to control the mammoth reader boards as well as to communicate data to Western Union and Reuters.

The Chicago Mercantile Exchange has remote job entry stations in New York City and at the nearby Chicago Board of Trade to accommodate those firms that operate out of New York or also deal at the CBT. Adding to the processing burden are the demands of the recently opened New Or-

leans Commodity Exchange.

When the New Orleans exchange opened, it took some people from Chicago, who felt it had a pretty good system. "And when it came time to figure out how New Orleans was going to do its data processing, it was decided they would go with something they were familiar with, so we are actually acting as a service bureau."

"Not only are we operating our own data processing, we are also processing an exact parallel system for the clearing firms and the New Orleans Commodity Exchange," Becker said.

Enlisted Additional Services

Becker has enlisted the services of Turnkey Systems, Inc. and Paradyne Corp. to keep the flow of trades under control. Turnkey Systems supplied its Task/Master on-line terminal control system; the Paradyne PIX system helps alleviate handshaking problems between the RJE stations.

Computers came to the Chicago Mercantile Exchange only about nine or 10 years ago. First there were card machines, then IBM 1130s. About five years ago most of the major clearing applications used in the trading process were rewritten in Cobol for IBM machines and the exchange moved up to a 370/135.

(Continued on Page 80)

Low-Cost, High-Speed

Datapoint Adds Band Printers

SAN ANTONIO, Texas — Datapoint Corp. has introduced a family of band printers for low-cost, high-speed printing applications.

The Model 9257 band printer offers a printing speed of 300 line/min and the Model 9258 runs at 600 line/min. Both feature a 132-col format and come with an acoustic enclosure.

The 9257 and 9258 use a rotating one-piece steel band that can be changed by the operator, allowing a variety of type faces.

The printers can use either single or multipart continuous form paper with up to five carbon copies.

The standard printing band for both models has a set of 64 char. at 10 char./in. Optional bands include the full 96-char. Ascii set at 10 char./in. and, on the 300 line/min model only, a 64-char. band at 15 char./in.

The printers range in price from \$10,000 to \$17,000, depending on the model and

options. Datapoint is at 9725 Datapoint Drive, San Antonio, Texas 78284.



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NOTE: Also DEC high speed printers — LP 11-AA, BA and WA models.

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TI-783
TI-785
TI-787
TI-810/820P's

Printer Handles Text and Graphics

GREENWICH, Conn. — Facit, Inc. has announced the 4542 serial matrix printer that handles both text and graphic applications. The firm also announced a serial interface for the 4542 and the firm's 4540 printers.

The 4542 uses Facit's Flexhammer print head that consists of nine metal hammers mounted directly on a magnet armature. Facit offers up to 15 variations of character sets and the unit can simultaneously perform scanning and gray-scale functions, permitting customers to individually control the print-head hammers, the vendor said.

According to the vendor, floating print heads provide automatic

adjustment of the copy control and the left-hand margin; horizontal tab sets and right-hand margin can be set anywhere by software commands.

The unit costs about \$4,000, the vendor said.

Also introduced was the Model 5162 interface that allows the 4540 and 4520 printers to operate synchronously or asynchronously with a range of protocols, including IBM's 2780/3780 and Burroughs Corp.'s TC500. The 5162 uses a standard 2K-byte input, but it can be expanded to 8K bytes.

The interface costs between \$150 and \$800, from the vendor at 66 Field Point Road, Greenwich, Conn. 06830.

Module Backs Development Of IBM Channel Interfaces

AUSTIN, Texas — Auscom, Inc. has announced an IBM channel-interface evaluation package that provides both end users and OEMs with the tools to attach non-IBM hardware to IBM mainframes. The package reportedly cuts the time involved in developing such interfaces.

The 8900 programmable channel interface module consists of three quad-width boards that appear as a single module to the Digital Equipment Corp. LSI-11 bus. Controlled by an LSI-11/2 or LSI-11/23, the 8900 provides channel-speed communications between any IBM (or compatible) selector, byte multiplexer or block-multiplexer channel and the

LSI-11 bus, the vendor said.

The 8900 can respond to any subset of 256 possible subchannel addresses, the vendor said.

The boards can use Auscom's Aries software library, a special-purpose operating system that provides high-speed data transfer in a variety of interface configurations through the use of emulator and device-driver modules in the Aries library. One or more modules on the IBM side of the interface can emulate control units for various IBM peripherals, the vendor said.

The package includes the channel-interface evaluation boards, the Aries source code and all interconnection cables and switches for \$6,995, Auscom said from Suite 102, 2007 Kramer Lane, Austin, Texas, 78758.

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Double Size Characters	STD	NO	NO	NO	OPT	NO
Smooth Scrolling	STD	NO	NO	NO	OPT	NO
Horizontal Split Screen	STD	NO	NO	NO	STD	NO
Video Attributes Require No Display Space	STD	NO	NO	NO	STD	STD
8 Area Qualifications	STD	NO	NO	NO	NO	NO
8 Resident Nat'l Char. Sets Including Line Drawing	STD	NO	NO	NO	NO	NO
Programmable Non-volatile Function Keys	STD	OPT	STD	NO	NO	NO
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Insert Delete Line with Push Up or Down	STD	NO	NO	NO	NO	NO
Insert Delete Character with Push Right or Left	STD	NO	NO	NO	NO	NO
Select Editing Extent to Field, Area, Line, Page	STD	NO	NO	NO	NO	NO
20 mA Current Loop	STD	STD	OPT	OPT	OPT	STD
Programmable Message Framing (non-volatile)	STD	NO	STD	NO	NO	NO
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Exchange Scene Tied Up Neatly

(Continued from Page 79)

The most recent upgrade was to the 4341s, which Becker expects to keep at least through the completion of their two-year lease contracts.

On-line applications development is the major thrust for the future, according to Becker. Once in place, such a capability will enable the DP department to simplify the trading process by eliminating misunderstandings that are presently not ironed out until after the day's data is batch processed.

The exchange accumulates a yearly telecommunications bill that ranges into the "hundreds of thousands of dollars," according to Becker.

Here's how a typical transaction works: A client who is interested in hog bellies calls his brokerage firm and instructs it to buy or sell a given amount. The broker communicates the request to its people on the floor, who man the terminals.

If the request is limited to a certain price, it is said to be time-stamped. That means that when the requested price is available, the broker is obligated to buy before the price changes or absorb the difference, he said.

Runners clad in yellow jackets to distinguish them from the traders, who are wearing red, are dispatched posthaste to the floor, where they pass the pertinent data on to the traders. The traders are then obliged to join the largely indistinguishable knot of humanity surrounding a selling trader, who waves his arms frantically as he calls out prices.

Emulating the broker, the traders vie for his attention, screaming out bids and noting their results on a pad. Returned by the runner, they are entered in the broker's terminal and duly communicated back to the buyer. They are also registered with a 4341.

The Chicago Mercantile Exchange has a six- to nine-month software development backlog, but it is not trying to beat it by getting fancy, Becker observed.

"We're not pioneers. The people on the trading floors don't pay us to experiment with every little new piece of code," he said.



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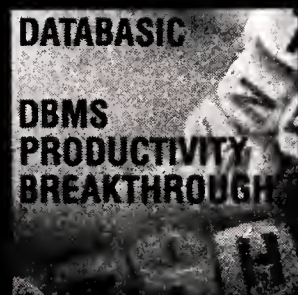
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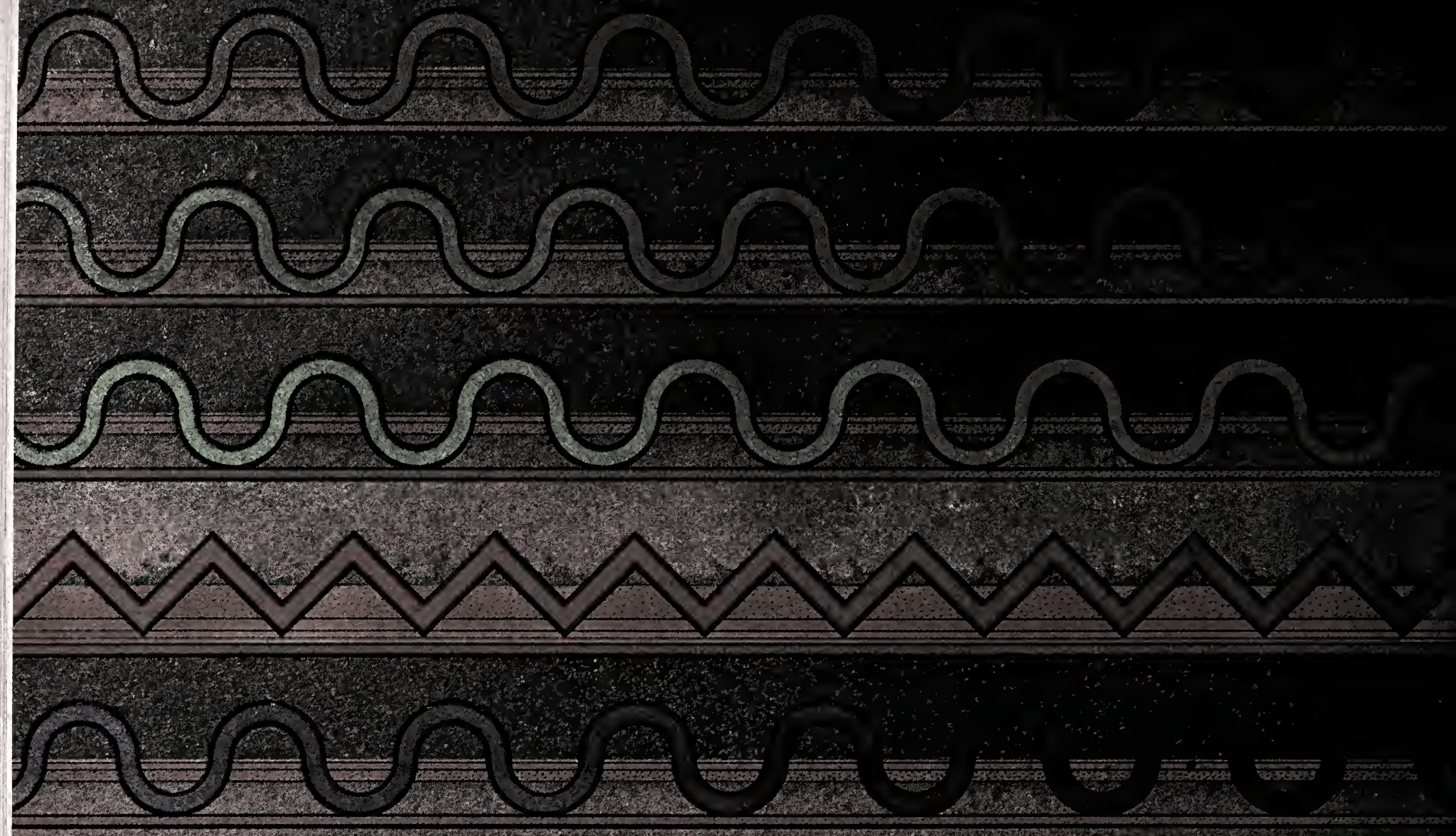
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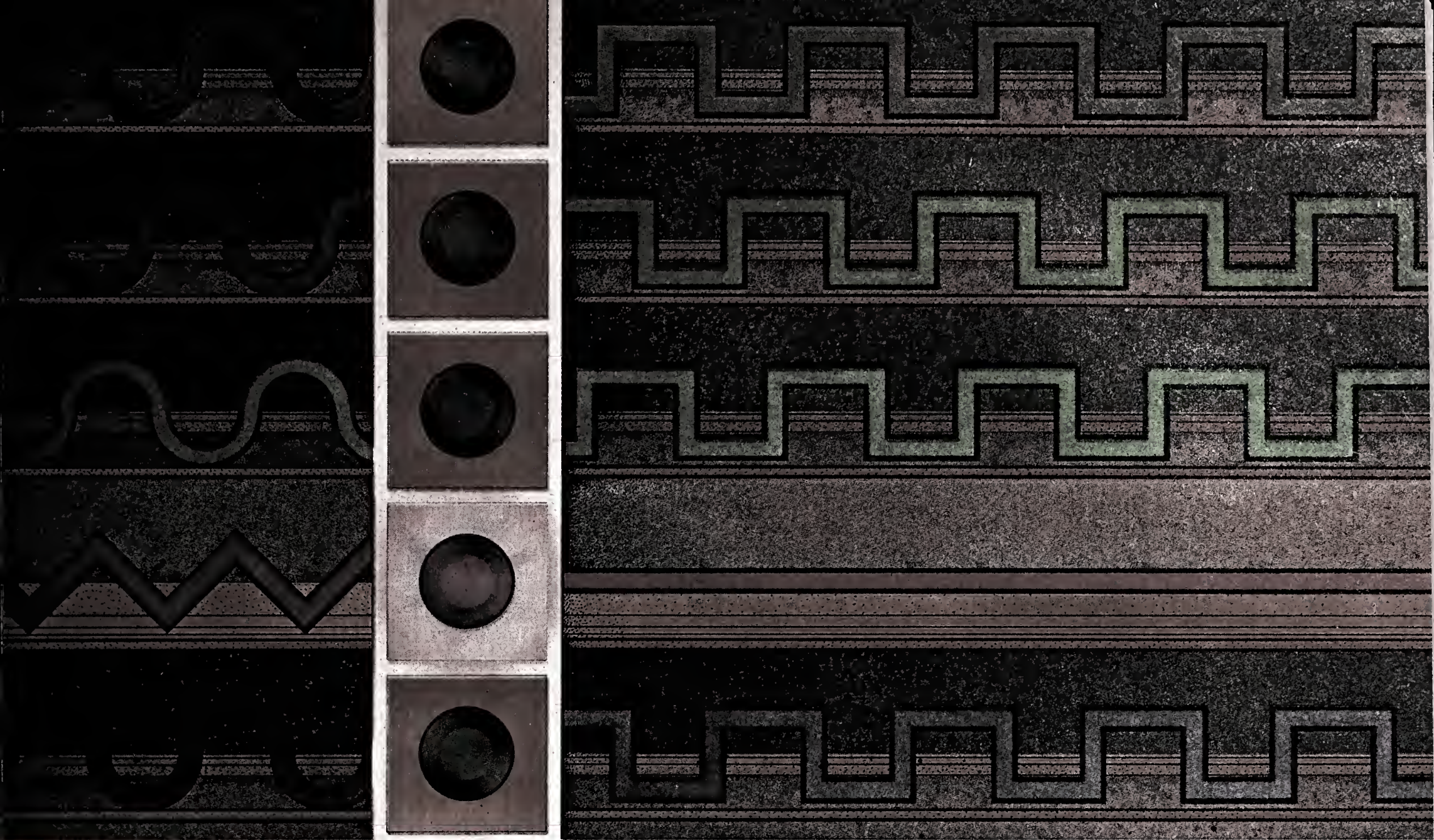
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Dataphone II service is state-of-the-art in sophistication, yet extremely simple in operation, and communicates in plain English.

With its full-time assurance of operational readiness, Dataphone II service is the ideal link to integrate your system. It is a product of the world's most advanced information management system—the nationwide Bell System voice and data network.

◆ Applying our knowledge to your information management needs is a process that begins with one call to your Bell Account Executive. —

The knowledge business



Printers Output Bar Codes

LYNWOOD, Wash. — A series of bar code printers for producing bar code labels and tags via an integral keyboard display, user-supplied auxiliary CRT terminal or a computer protocol has been announced by Interface Mechanisms, Inc.

The S Series is available in three print formats — bar code with interpretation line, interpretation line with one line of free text and interpretation line with three lines of free text, the vendor said.

It is designed for on-site, random-access bar code label preparation. The S Series printers are priced starting at \$5,945 from Interface Mechanisms, Inc., P.O. Box N, Lynwood, Wash. 98036.

Mapping Turnkey Handles Large Files

LITTLETON, Colo. — Interactive Systems Corp. has announced a turnkey interactive graphics mapping system that uses a hierarchically structured data base technique to reportedly accommodate very large data files.

The Interactive Mapping System can define the interiors of boundaries and handle dynamics such as weather and vehicle movement, the vendor said.

The system supports simultaneous usage by multiple users and features access rates that are independent of the size of the data base. A display management package provides the capability for interactive input, modification, querying and display of multiple map files.

The system uses the Digital Equip-

ment Corp. VAX-11/780 as a host processor. It can be interfaced to a Megatek Corp. or several other graphics display systems, the vendor said.

The package may be purchased as a turnkey system including a host processor, all software, peripherals and graphics displays. However, current VAX owners may purchase the GBT Record Access Manager as a stand-

alone package. Users can also purchase the complete software package if using a graphics display system, the vendor said.

Prices for the Interactive Mapping System, which is directed at the energy, utility, demographic and transportation industries, start at \$400,000. Interactive Systems Corp. is based at 550 S. Sycamore, Littleton, Colo. 80120.

Film Plotters Introduced

SANTA CLARA, Calif. — Versatec, a division of Xerox Corp., has announced three film plotters that draw on electrographic film.

Called the 8222-F, 8236-F and 8242-F, the units print on a 4-mil polyes-

ter-based medium designed specifically for electrostatic printing, the vendor said.

The 8222-F plots on 22-in.-wide media at one in./sec to draw 8.8 sq ft/sec. The 8236-F plots on 36-in.-wide media at .75 in./sec to draw 11 sq ft/sec. The 8242-F plots on 42-in.-wide media at .5 in./sec to draw 8.5 sq ft/sec, the vendor said.

All units offer 200 point/in. resolution on film or paper (opaque or translucent). Optional thermal dryers are available to speed image drying, the vendor said.

The 22-in. 8222-F costs \$30,000, the 36-in. 8236-F costs \$47,400 and the 42-in. 8242-F costs \$61,200, the vendor said from 2805 Bowers Ave., Santa Clara, Calif. 95051.

Transport Gets Cartridge Unit

HAUPPAUGE, N.Y. — North Atlantic Industries, Inc.'s Qantex Division has introduced a cartridge transport designed specifically for Winchester hard-disk backup applications.

The Model 401 is similar to the previously announced Model 400 except that it uses special read-after-write recording heads that accommodate the bidirectional tape operation used in nonstop serpentine recording applications.

The Model 401 transport stores up to 17M bytes on a DC-300XL tape cartridge, using a 6,400 bit/in. recording density and 30 in./sec tape speed. The data transfer rate is 24,000 byte/sec at 30 in./sec tape speed. By eliminating the need to rewind the tape, the transport can eliminate three minutes of dead time and interruption of transfers, the firm said.

The Model 401 costs \$1,835 from Qantex at 60 Plant Ave., Hauppauge, N.Y. 11787.

Ramtek Offers Encoder Card Option

SANTA CLARA, Calif. — Ramtek Corp. has announced a VCO/Encoder card that makes a variety of computer graphics capabilities available for broadcast and related applications. The encoder card is designed for the firm's 6214 and 6212 Colorgraphic Computer devices.

The encoder card reportedly modifies the standard computer graphics output signal so it can operate with broadcast television, closed-circuit television, video recorders and other RS-170/189-compatible equipment, the vendor said. The encoder costs \$8,000, the vendor said from 2211 Lawson Lane, Santa Clara, Calif. 95050.

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1270 Transmission
Control Unit

2089 Line
Printer

1380 Communications
Processor

2078 Display
Station

2087 Matrix
Printer

1300 Screen
Printer

(Products not shown to scale.)

2076 Remote
Cluster Controller

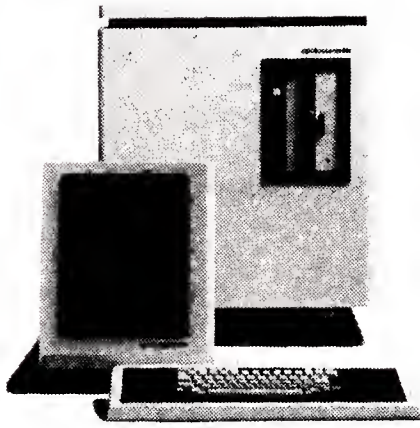
1377 Display
Station

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DOMAIN PROCESSING



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With the introduction of Apollo's DOMAIN, you can now get both the resource and data sharing capabilities of today's best timesharing systems with all the performance and responsiveness of a dedicated mini—all in one cost-effective system.

DOMAIN (Distributed Operating Multi-Access Interactive Network) processing is a new and dramatically different approach to computing. It's a high performance

local network of dedicated computers in a distributed environment. Its unique architecture is designed to allow each user maximum autonomy within the network, while retaining the vital communications and resource sharing capability among every user.

The principal advantages of DOMAIN are greater system productivity and total system cost-effectiveness. The key to these advantages are:

A high level of predictable performance, including a VLSI CPU (with 32-bit architecture) dedicated to each user on the network, executing in a 16 megabyte demand paged virtual memory.

A new mode of user machine interactivity, including a high-resolution bit map display permitting each user to run multiple programs simultaneously.

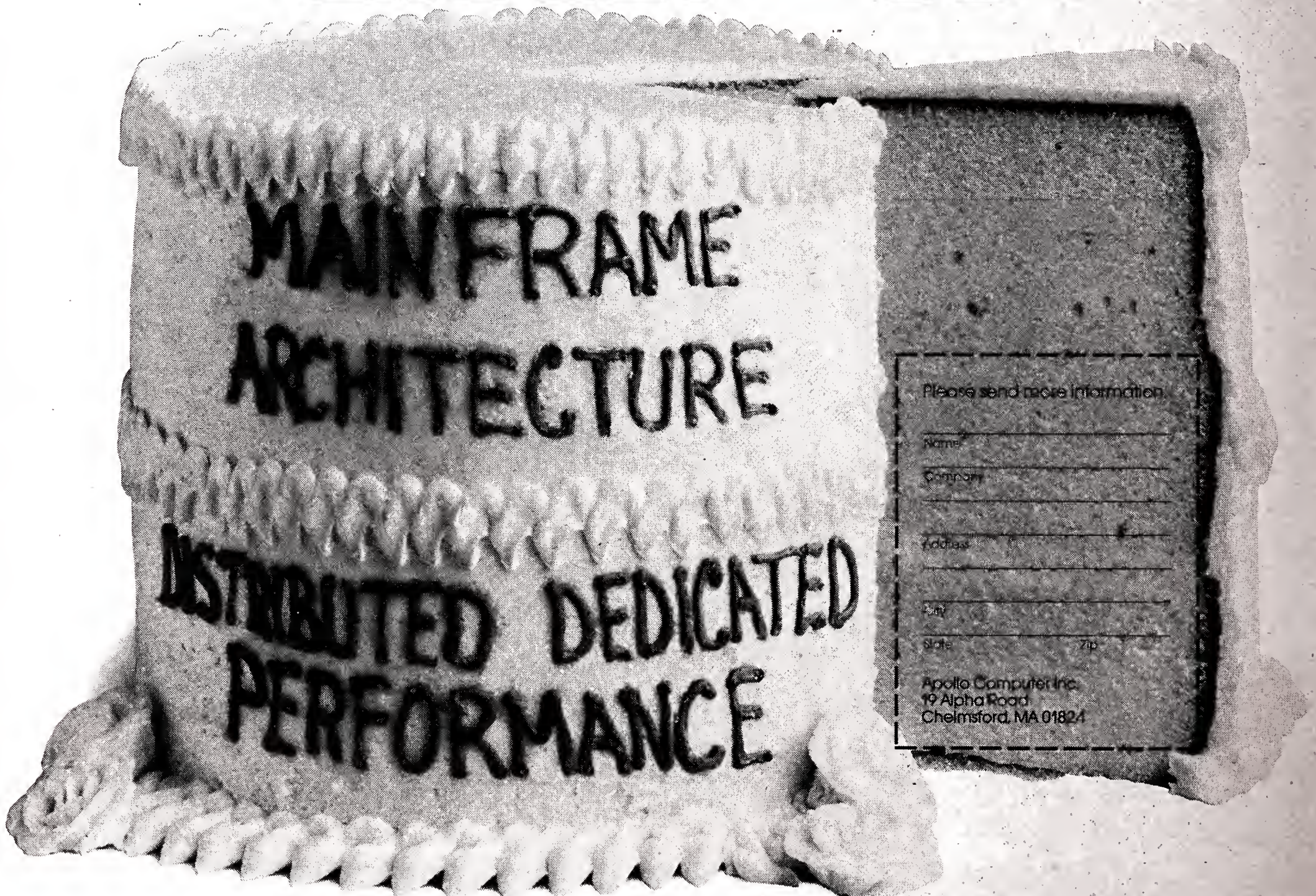
A network level modularity, providing a system with a very high performance level, a wide range of growth capability, and a vast improvement in system reliability and availability.

DOMAIN is designed to accommodate a wide range of application environments, including scientific, engineering, research, finance, CAD/CAM, text processing and transaction processing. The system is capable of running very large, single program applications, as well as multiple program applications.

By configuring dedicated CPU's in a network architecture, Apollo's DOMAIN really does let you have your cake and eat it too.

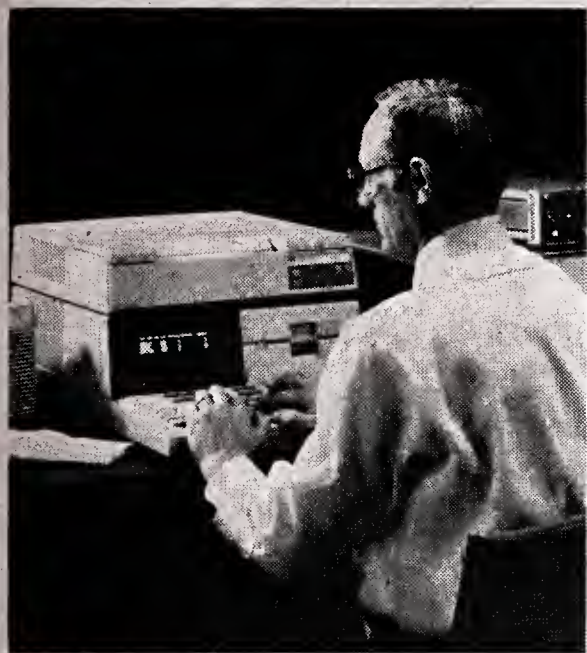
For more information on DOMAIN processing and Apollo Computer, simply fill out and return the coupon below.

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apollo computer

Apollo Computer Inc., Headquarters: Chelmsford, MA: (617) 256-6600; District Offices: Mountain View, CA: (415) 967-3231; Edina, MN: (612) 835-4541; Wayne, PA: (215) 964-8510; Dallas, TX: (214) 239-8528.



HP 2671G Atop HP 9826

HP Unveils Desktop Offering Multilanguages

PALO ALTO, Calif. — Hewlett-Packard Co. has introduced a multilanguage desktop computer for the computer-aided test, engineering and manufacturing areas.

The company also unveiled additional models of its 9845 machine line, three thermal printers and data communications software that provides distributed systems networking capabilities to its top-of-the-line desktop systems.

The multilanguage desktop, the HP 9826A, currently offers a choice of two programming languages, Basic or the firm's HPL. Pascal will be added at a later date, a spokesman said.

The system has up to 512K bytes of user memory and a 7-in. CRT terminal screen. It also provides up to 15 levels of priority program interrupt. The computer's speeds are said to be two to five times faster than the firm's 9825 computer at roughly the same price.

The 9826A incorporates a data communications interface that provides both asynchronous protocol and HP's Distributed Systems Networking (DSN) data link protocol. The computer also has an IEEE-488 interface and four optional interface cards for external devices, the spokesman said. A graphics capability allows a raster display of 400 dots by 300 dots.

The new models of the 9845 provide such features as a monochromatic CRT terminal graphics display capable of producing 17 shades of brightness for area fill. To accommodate this feature, the monochromatic computer versions include programmable soft keys, an optional light pen and high-level graphics for drawing geometric figures.

The additional 9845s, which bring to 14 the number of models offered, run compu-

(Continued on Page 88)

First Burroughs B900 Goes To Machine Parts Firm

By Tim Scannell
CW Staff

BLAIRSVILLE, Pa. — While learning from other users' experiences is an easy and often sure way to avoid trouble, a manufacturer here chose not to go that route.

Blairsville Machine Products Co., founded in 1945, is a fast-growing company that manufactures parts for military tanks and offers a range of machine services. It recently installed a multiprocessor Burroughs Corp. B900 computer system. In fact, the company is the first user of the minicomputer, which was introduced late last year.

Blairsville Machine's eight-processor system can handle up to 1.5M bytes of main memory; it currently supports 10 on-site terminals and two off-site workstations. The remote sites, located in Blairsville and nearby Latrobe, are equipped with line printers and supply the central site with accounting, production control and other information, according to Michael Kirkell, a partner with the company.

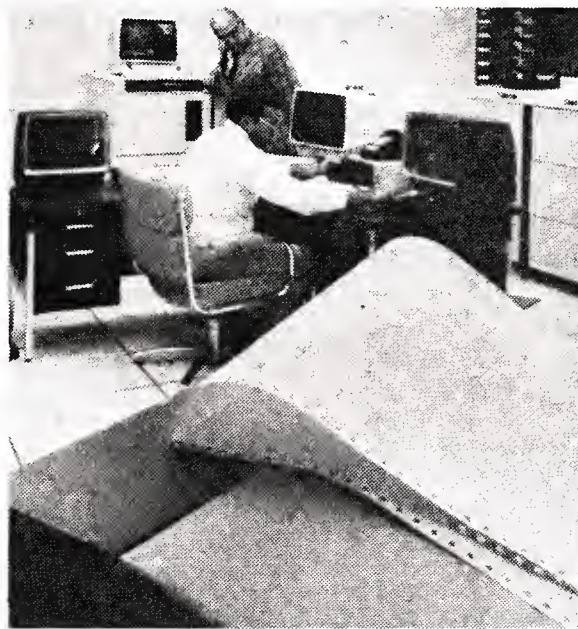
Business Boom

Blairsville Machine originally did all of its accounting and billing functions with a Burroughs B800 system, but decided to add the B900 to increase processing throughput and support an on-line data communications network. In addition, the company's business has grown about 400% over the last few years, so it actually outgrew the processing capabilities of the B800, Kirkell explained.

Because the firm never really had any trouble with its B800 machine, it transferred all of its programs to the B900 when the system was delivered last fall. The B800 is still in operation and works in conjunction with the B900.

The B900 has been running virtually trouble free since it went on-line. However, a few weeks ago the company suffered an electrical outage over a holiday weekend and a number of the computer's control cards were damaged. While Blairsville Machine's system does not have a backup power supply, it does have a power supply filter that is supposed to protect against power surges or spikes. However, the filter did not protect the machine against the recent outage, L. Harold Kirkell, president of the company, said.

Besides handling such on-line applications as payroll, accounts payable and general ledger, the B900 tracks specific customer orders, keeps maintenance information on the company's trucks and operates an equipment depreciation system. Its production control system can also



L. Harold Kirkell (standing) and Mike Kirkell of Blairsville Machine, first user of the Burroughs B900, are currently working with both a B800 and B900.

interface with the machine's payroll application to determine individual employee productivity, Michael Kirkell explained.

Software on the system includes Burroughs' Master Control Program, commercial business management system, report writer and command and edit language.

Turnkey Speeds Currency Changes

BEDFORD, Mass. — Distribution Management Systems, Inc. (DMS) has unveiled a turnkey computer system designed to blend the order entry, inventory management and accounting functions with multicurrency conversion, multilanguage translation, duty accounting and bonded warehouse capabilities into one systems architecture.

The DMS-1000/Multinational System reportedly allows the centralization and consolidation of operations crossing international borders, currencies and languages with common paperwork. The system is based on Digital Equipment Corp. PDP-11 (running under RSX-11M and RSX-11M-Plus operating systems) and VAX (running under VMS) minicomputers.

The DMS-1000/Multinational System ranges in price from \$400,000 to \$500,000. This includes the hardware, software, modifications, customer training, installation support, documentation and source code.

The vendor is located at 11 DeAngelo Drive, Bedford, Mass. 01730.

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Nestar File Server Upgrade Offers Users Unlimited Storage

PALO ALTO, Calif. — Nestar Systems, Inc. has announced a virtually unlimited file storage capability for local minicomputer networks using the firm's Cluster/One Model A Network File Server.

Through a series of hardware and software enhancements, the firm's file server now allows Apple Computer, Inc. Apple II microcomputers to access disk memory in 16.5-, 33- or 66M-byte increments. The system's capacity is a practical limit of about 4G bytes, the vendor said.

Version 1.1 of the firm's network server also incorporates additional

features, including a real-time clock/calendar, turnkey applications support, support of the Apple DOS 3.3 operating system and the Apple Pascal 1.1 programming language.

Version 1.1 also provides a 30% improvement in disk I/O speed, a doubling of the number of concurrently open files from 40 to 80 and improvements in system noise immunity and fault detection, the vendor said.

A typical 32M-byte system costs \$12,800, not including the Apple processors, the firm said. from 2585 E. Bayshore Road, Palo Alto, Calif. 94303.

Cardamation Reader Punch Out for PDP-11, LSI-11s

FRAZER, Pa. — Cardmation Co. has announced an 80-column data entry and peripheral unit for Digital Equipment Corp.'s PDP-11 and LSI-11 processors.

The Model RP8211 reader/punch can read 80-column punched cards at 200 card/min and punch (with printing) at 45 to 75 card/min, the vendor said. The unit is an alternative to the DEC CR11 reader. When not being used as a card peripheral, the RP8211 can be used as a free-standing 80-column keypunch, verifier, reproducer and interpreter. According to the vendor, editing of selected columns is possible through punch-suppressing and editing fea-

tures.

The RP8211, including a reader punch, keyboard, interface cable and interface module, costs \$8,500 and plugs into the PDP-11 LSI-11 backplane. The unit costs \$388/mo on a three-year lease and \$239/mo on a five-year lease. Maintenance is available for \$115/mo, the vendor said. More information is available from P.O. Box 746, Frazer, Pa. 19355.

HP Unveils Desktop Mini

(Continued from Page 87)

tation-intensive programs at more than three times the speed of previous versions. This speed improvement reportedly results from replacing the 9845's language processing unit by a microprogrammed bit-splice processor.

Programs written for the new models are completely compatible with the older machines.

The thermal printers were designed to match the recently introduced 9826 in size and appearance. The printers offer 120 char./sec bidirectional printing. Standard features include character sets for languages other than English, and all three units use fanfold thermal paper, the spokesman explained.

Finally, with the new data communications software, HP's top-of-the-line DS/35 and DS/45 computers can be linked to the larger HP 1000 or HP 3000 minicomputers.

Other Packages

Other firmware/software unveilings include an assembly program translator utility software package for the HP 9835 and 9845 desktop computers and a plug-in, read-only memory (ROM) for the HP 9845. The latter product provides structured programming commands to enhance programmer productivity and facilitate software maintenance. The HP 9826A is priced from \$8,950 to \$11,950, depending on whether it is disk- or ROM-based. Prices of the additional 9845 models range from \$28,000 to \$43,500.

The printers cost \$1,095 for the entry-level Model 2671A; \$1,295 for the HP 2671G, which produces high-resolution graphics from the computer's CRT terminal screen; and \$1,895 for the 2673A, which has all the features of the above two printers and additional raster graphics functions and print and character set enhancements.

The price for either the DS/35 or DS/45 software is \$500. However, the customer must also order an HP 98046B intelligent serial interface card for \$1,000 and both basic and RJE bisynchronous data communications ROM memories for \$525 each in order to implement the software. The optional 98036A serial interface card, necessary to add autodial capabilities, costs \$735.

Additional information on the new systems, printers or software can be obtained from HP headquarters, 1501 Page Mill Road, Palo Alto, Calif. 94304.

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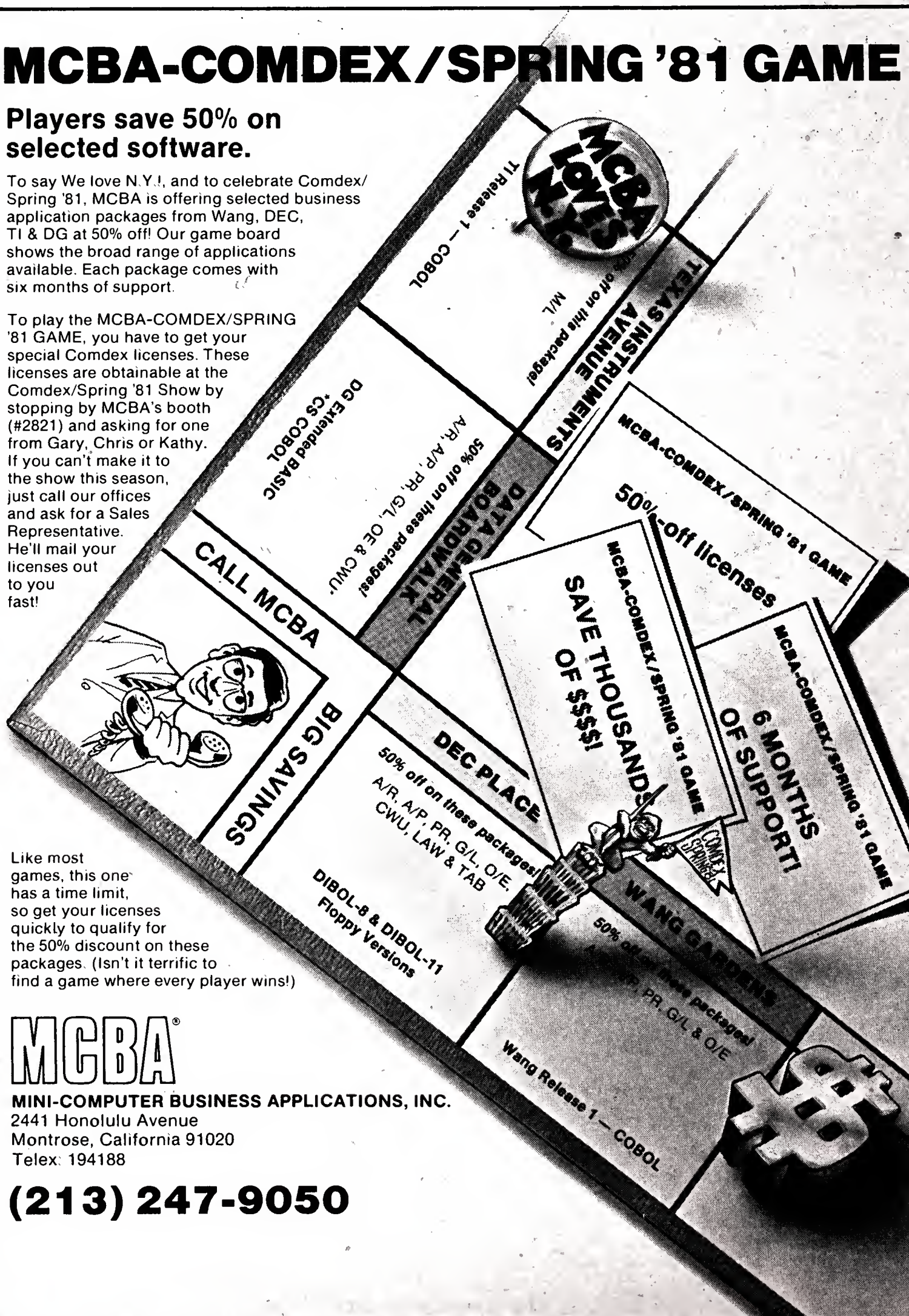
To play the MCBA-COMDEX/SPRING '81 GAME, you have to get your special Comdex licenses. These licenses are obtainable at the Comdex/Spring '81 Show by stopping by MCBA's booth (#2821) and asking for one from Gary, Chris or Kathy. If you can't make it to the show this season, just call our offices and ask for a Sales Representative. He'll mail your licenses out to you fast!

Like most games, this one has a time limit, so get your licenses quickly to qualify for the 50% discount on these packages. (Isn't it terrific to find a game where every player wins!)

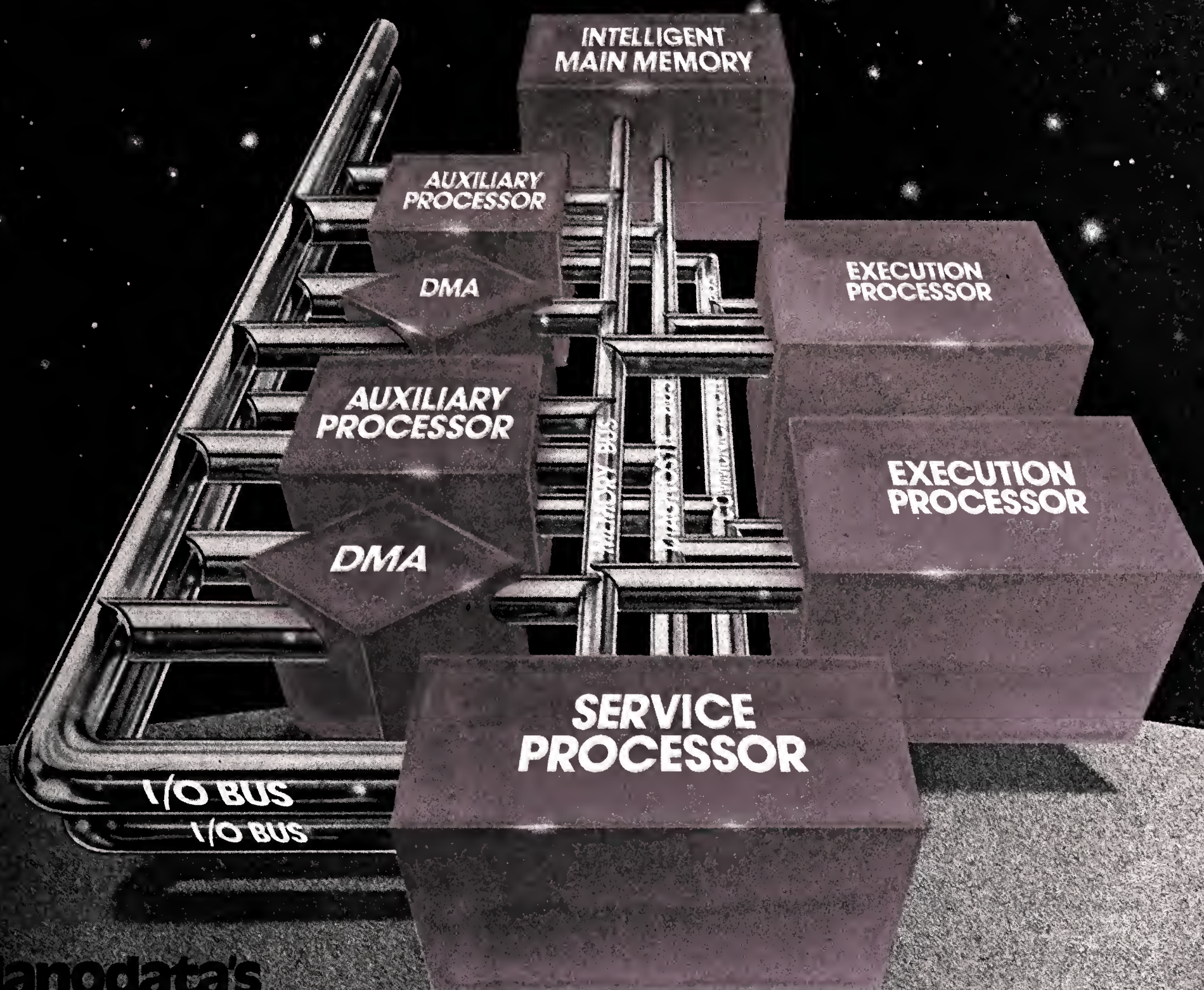
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TI Minis Handle Manufacturing

WAYZATA, Minn. — DBSI Information Systems, Inc. is offering the Closed Loop manufacturing resource management system, a turnkey system based on Texas Instruments, Inc. Model 990/10 and 990/12 processors.

The set of applications with the turnkey system is written in Cobol and currently runs under TI's DX10 operating system.

Applications include prod-

uct definition, purchasing/receiving, production control, material planning, production planning, sales order entry, accounts receivable, accounts payable, general ledger and sales analysis.

According to the vendor, the system features immediate on-line updating, complete security control, immediate print capability of all screen displays, print spooler with multiple printer sup-

port, on-line "Help" documentation for procedures and data fields (by pressing a documentation key) and on-line query for contents of data fields (by pressing a query key).

The installed price of the system is \$125,000 including software, the complete mini-computer system and four to five terminals from DBSI at Twelve Oaks Center, Suite 1017, 15500 Wayzata Blvd., Wayzata, Minn. 55391.

Vista Adds Subsystem

SANTA ANA, Calif. — An 8-in. subsystem said to accommodate mass storage units ranging from single-sided 8-in. floppy disks to 20M-byte streaming tape and 40M-byte Winchester disks has been announced by Vista Computer Co.

The V1000 is priced from \$1,095 to \$2,295 from the firm at 1317 E. Edinger Ave., Santa Ana, Calif. 92705.

Xylogics Emulates DEC Unit

BURLINGTON, Mass. — Xylogics, Inc. has introduced the 652 peripheral processor that emulates the Digital Equipment Corp. RK611/RK711 disk controller on DEC computers with Unibus.

The 652 peripheral processor supports the Control Data Corp. 9448 fixed/removable disk drive or equivalent to emulate the DEC RK06/07. The DEC operating systems RT-11, RSTS/E, RSX-11M for PDP-11s and VMS on the VAX computers are supported when used with the 652 peripheral processor, according to the firm. Current VAX users can use the 652 and the CDC 9448 as a systems and data device, the firm said. The 652 is the only device in the industry that provides the VAX user with two RK07s in a single disk drive, Xylogics claimed.

Installation of the processor in the VAX computer requires no software changes to the DEC operating system. The 652 costs \$4,950 from the firm at 42 Third Ave., Burlington, Mass. 01803.

Intelligent Unit, Controllers Up Disk Efficiency

PALO ALTO, Calif. — Minicomputer Technology has announced an intelligent module that works with the firm's family of disk-emulating controller boards to reportedly improve disk subsystem throughput.

Transparent to the host processor, the modules incorporate a caching algorithm that reportedly reduces seek time and rotational latency delays up to 80%.

The Turbo-21 is a single-board unit designed to work with the EDC21 disk controller on Digital Equipment Corp. PDP-11 and Vax processors. The unit uses 128K bytes of random-access memory with transparent refresh, which allows the board to store 256 sectors of data.

A microcomputer uses a proprietary algorithm that caches the most frequently and recently used sectors on the board. This, the firm said, eliminates the need for frequent disk access.

Minicomputer Technology said it plans to introduce similar controllers for the firm's EDC22 (for Data General Corp. systems), EDC23 (for Perkin-Elmer Corp. systems) and the EDC24 (for DEC LSI-11 systems) in the near future. The Turbo-21 costs \$6,750 per unit, the vendor said from 2470 Embarcadero Way, Palo Alto, Calif. 94303.

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Snap-on ribbon cassette
The print ribbon is contained in a quick-change, snap-on cassette that eliminates threading and fabric handling.

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Load forms easily from the bottom or the rear
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use one- to five-part forms from 4 to 16 3/4 inches wide. Compressed pitch as well as all character variations are under software control and are easily changeable. The print ribbon cassette snaps on-and-off easily. Forms load from the rear, but for even more versatility a bottom forms feed model is available. And all of this locates up to 500 feet from your Series/1 CPU.

Yes, we've engineered a lot of customer convenience and versatility into our Certainty 420 design, to give you a lot more than a basic matrix printer for your money.

You won't have to worry about service, either. More than 4,800 Customer Engineers in our worldwide maintenance organization support our products.



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Tandon

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Printer Built For Heavy Duty

NEW YORK — An 80-col dot matrix printer designed for heavy-duty cycle operation at a printing speed of 80 char./sec has been announced by Star Micronics, Inc.

The Model DP-8480 features bidirectional printing, interface flexibility, three software-selectable character pitches, built-in self-test and replaceable printing head with a life expectancy of 100 million characters, the vendor claimed.

Designed for minicomputer and microcomputer systems and for medical and scientific instruments and telecommunications systems, the Model DP-8480 printer is priced at \$495 from Star Micronics, Inc., 200 Park Ave., New York, N.Y. 10166.

Black Box III Debuts in U.S., Third-Generation Micro

SANTA CLARA, Calif. — Rair Microcomputer Corp. has announced Black Box III, a third-generation microcomputer aimed at large-volume users.

Introduced in Europe last year and presently making its U.S. debut, the Black Box III Model 3/30 uses a standard RS-232C serial port and an IEEE-488 parallel bus to support up to 16 peripheral devices. These devices include terminals, printers and modems.

The processor features a 5.25-in. Winchester disk drive and 64K bytes of random-access memory that is expandable to 512K bytes in either 64K- or 256K-byte increments.

From a basic single-user system, the Model 3/30 can be expanded to support a multiterminal system with network capabilities, the vendor said.

In addition, the Model 3/30 is supported by single-user, multiuser and multiprogramming operating systems along with a shared-resource network feature. Compatible languages include Basic, Fortran, Cobol, Pascal and PL/I, according to the vendor.

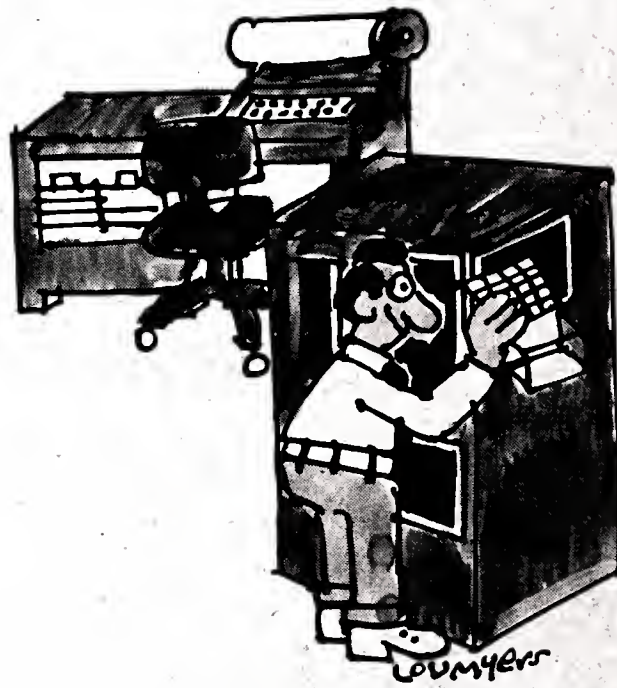
The Black Box III is targeted to OEMs and system integrators, but costs \$7,500 in single quantities, the vendor said from 4101 Burton Drive, Santa Clara, Calif. 95050.

Micro Works For Businesses

HAUPPAUGE, N.Y. — A stand-alone microcomputer that contains the microprocessor as well as all other essential components in a single console the size of a standard typewriter is available from Q1 Corp.

The Microlite II office and business system includes a 40-by-12 plasma-character display, 48K bytes of main memory and two 400K-byte floppy disk drives, and an optional dot matrix printer can be housed in the console, the vendor said.

The basic Microlite II system is priced at about \$9,000 with options and enhancements available from Q1 Corp., 125 Ricefield Lane, Hauppauge, N.Y. 11787.



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Cromemco Tape Gives Backup

MOUNTAIN VIEW, Calif. — Cromemco, Inc. is offering to microcomputer users a 9-track tape system that reportedly provides a means of data backup, long-term recordkeeping or archival storage and data exchange with other IBM/Ansi standard systems using 1,600 bit/in. format.

The tape drive and intelligent controller, which can store over 40 million bytes on a reel of tape, are able to read, write or search at tape speeds of 25- and 100 in./sec without intervention. The tape drive can operate in either a start/stop mode, where the reels are brought to rest in the inter-record gaps, or in the streaming mode where data and gaps are written "on-the-fly," the vendor said.

As many as eight drives may be daisy-chained from a single interface card, and up to 16 such interface cards may be connected to each I/O processor. Multiple processors also may be included in a single main system, according to Cromemco.

The tape system, including transport, formatter, intelligent controller and all cables, costs \$7,995 with delivery scheduled from Cromemco at 280 Bernardo Ave., Mountain View, Calif. 94043.

Enhanced Horizon Supports Five Units

SAN LEANDRO, Calif. — The North Star Computer, Inc. Horizon microcomputer system with hard disk has been enhanced with a multiuser operating system to allow support of up to five terminals.

The TSS/A system supports the company's integrated application software system and provides users with shared access to the system programs, the vendor said.

The company also announced a four-port serial I/O board, the HSIO-4, said to be S-100 bus-compatible and able to support asynchronous and synchronous communications with RS-232 or current loop options.

The HSIO-4 board is priced at \$349 and a typical Horizon configuration costs in the \$10,000 range from North Star Computers, Inc., 14440 Catalina St., San Leandro, Calif. 94577.

Local Data Controller Ties Printronix Printers to HP

TORRANCE, Calif. — Local Data Co. has announced a Datalynx printer controller that allows Printronix Corp. 300- and 600 line/min printers to be driven by Hewlett-Packard Co. processors.

Printronix dot matrix impact printers can be used to create bar codes, graphs, company logos, drawings and other graphics images. It also can be used with an unlimited number of fonts, the firm said.

The Local Data Datalynx printer controller is plug-compatible with the HPIB interface bus for the HP 250, 300 and HP 300 series 30, 33 and 44 processors. No software changes

are required, the vendor said.

The controller is compatible with Printronix printers' QSM cards that program the printer to overlap a matrix of dots to print solid bar codes and other graphics.

The Datalynx unit converts the HPIB output to asynchronous serial format, which can be conducted more than 15 meters by an RS-232C cable. Modems and other RS-232C peripheral devices can be used with the Datalynx controller, the vendor said.

The Datalynx controller costs \$2,395, the vendor said from 2701 Toledo St., Torrance, Calif. 90503.

TRS-80 Uses IBM-Type Memory, Two Kinds of IBM Terminals

FORT WORTH, Texas — Radio Shack has announced that its TRS-80 Model II can now read from and write to IBM-compatible memory diskettes.

The company also unveiled two communications software packages for the Model II that allow it to operate with two types of IBM terminal equipment used for on-line communications or batch processing, the vendor said.

Reformatter performs as an IBM-compatible workstation and automatically organizes data originating in the TRSDOS format to conform to the IBM 3741 single-density format.

Character code conversion from Ascii to Ebcidic is also automatic. It costs \$249, the vendor said.

The on-line standard Binary Synchronous Communications (BSC)

3270 program lets the Model II communicate with IBM 360/370 and 30-series CPUs or any non-IBM devices equipped with remote BSC-3270 communications capabilities. It gives the Model II the functions of a 3270, 71, 75 or 77 display station.

The batch standard Binary Synchronous Communications 3780 program permits the Model II to function as an IBM-compatible RJE terminal. It allows user selection of IBM 2770, 2780, 3780 or 3741 terminal protocols for communications with 360/370 or 30 series host systems, with Digital Equipment Corp. PDP-11 and VAX-11 host systems, or with other devices equipped for bisynchronous communications capability.

Both programs cost \$995, Radio Shack said from 1800 One Tandy Center, Fort Worth, Texas 76102.

Micro System Runs Hard Disks

SAN JOSE, Calif. — A multiuser microcomputer system that combines 10M bytes of hard-disk storage with floppy disk or magnetic tape backup media has been developed by Altos Computer Systems, Inc.

The Z-80-based ACS8000-10 integrates the Altos single-board computer and DMA controller with an 8-in. Winchester hard disk, the vendor said. Mounted in a standard 19-in. rack, the unit has 208K bytes of internal random-access memory and is capable of accommodating four users.

The system has six programmable serial ports, an RS-232 communications port and handles data rates up to 800K bit/sec. The 8000-10 is based on the CP/M/MP/M operating systems and can be used with most widely used languages, such as Fortran, Basic, Cobol and Pascal.

The unit costs \$8,500 with single-sided floppy disk, \$9,500 with double-sided floppy disk and \$10,990 with magnetic tape cassette. The firm is located at 2360 Bering Drive, San Jose, Calif. 95131.

Atari Cuts Prices on Some Items

SUNNYVALE, Calif. — Atari, Inc. has reduced prices on selected computer, memory and peripheral products.

The 400 Personal Computer system with 16K bytes of random-access memory (RAM) was reduced 37% from \$630 to \$399. The 8K- and 16K-

byte RAM memory modules now cost \$49.95 and \$99.95 respectively, and the 40-col Model 820 impact printer was reduced to \$299.95 from \$449.95.

Atari is based at 1265 Borregas Ave., P.O. Box 427, Sunnyvale, Calif. 94086.

System Handles Drafting Uses

CHICAGO — AM International, Inc. has announced Easydra2, a stand-alone computer-aided drafting system for architectural and mechanical applications.

The vendor claimed the system can increase productivity by about 20% with such features as a built-in thermal line printer, two on-line flexible

disk drives and optional Winchester hard disk drives and a companion graphics tablet.

The system comes with 318K bytes of memory, an interactive keyboard and a monochromatic CRT terminal and costs \$70,000, the vendor said from 1900 Ave. of the Stars, Los Angeles, Calif. 90067.

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Compuscan Ties OCR Readers To IBM 5220

TETERBORO, N.J. — Compuscan, Inc. has announced an interface that connects the firm's Alphaword III optical character recognition (OCR) page readers with IBM's 5220 administrative system for high-speed text and data entry.

By integrating the Alphaword III and the 5220, text or data typed on a standard single-element typewriter can be input directly to the 5520 without rekeying.

Alphaword III OCR page readers have a 32-character LED display, and a fully interactive keyboard that allows an operator on-line editing capabilities while text is being scanned, the vendor said.

The interface costs \$2,000 from the vendor at 900 Huyler St., Teterboro, N.J. 07608.

Magazine Runs On IBM Minis

WALTHAM, Mass. — Dennison Kybe Corp. has announced an automatic loading diskette magazine compatible with IBM's Series/1, System/34 and System/38 processors.

Manufactured under a license from IBM, the magazine holds 10 8-in. flexible disks for use on IBM systems with autoloader disk drives. Each magazine can store up to 16M bytes of unformatted data or 10M bytes of formatted data, the vendor said.

The magazine can reportedly cut disk handling, improve throughput and serve as a protective storage compartment when disks are not in use, the vendor claimed.

A single magazine loaded with 10 disks costs \$58. The magazine without the disks costs \$11.50, the vendor said from 82 Calvary St., Waltham, Mass. 02254.

Emulex Cuts Product Prices

SANTA ANA, Calif. — Emulex Corp. has announced price reductions on three of its products, the SC01 and SC11 disk controllers and the recently introduced CS11/H communications multiplexer.

The SC01 controller, designed for Digital Equipment Corp.'s LSI-11 microcomputer, has been reduced 21% to \$3,950.

The SC11 controller for DEC's PDP-11 was cut 17% to \$5,000 for Emulex customers on the company's discount schedule that was effective last Oct. 1.

Finally, the CS11/H multiplexer, used on PDP-11 and VAX-11 computers, has been reduced from \$5,800 to \$4,950. The unit's 16-channel capability can be expanded by 16 more channels for \$3,500.

In addition to dropping end-user single-quantity prices, the firm also dropped OEM prices, a spokesman noted. Additional information on the discounts can be obtained from the firm at 2001 E. Deere Ave., Santa Ana, Calif. 92705.

System Handles Manufacturing

SOUTHFIELD, Mich. — A manufacturing control system, including an IBM 5120 computer, is available for less than \$30,000 from American Business Computer.

Oriented toward repetitive manufacturing environments, the system supports full material requirements planning with an indented bill of materials of up to 20 levels.

The system also features physical inventory tag support; disk inventory audit trail; time-phased, bucketless production planning reports; and purchasing support.

American Business Computer is located at 16000 W. Nine Mile Road, Southfield, Mich. 48075.

Printer Runs On Datapoint

LAGUNA HILLS, Calif. — D&O Leasing, Inc. has announced the Point-Saver, a modified dot matrix printer manufactured by Epson, Inc. that can be used in Datapoint Corp. Datapoint and Datashare environments.

The Point-Saver can be configured to operate in conjunction with a remote terminal or as a remote slave port using a multipoint communications adapter. The Point-Saver printer has additional line buffering that allows transmission rate selections of up to 9,600 bit/sec. The printer also features bidirectional printing of up to 132 col when used in a compressed mode.

Other standard modes include: graphics, emphasized double-strike and double-width print. In addition, foreign language characters are available in interchangeable modules, according to the vendor.

Point-Saver is available with adjustable paper tractors to accommodate multipart copies. Internal self-diagnostics and a disposable print head are also featured to cut down on service personnel, the vendor claimed.

Point-Saver costs \$769, the vendor said from 22361 Peralta Drive, Laguna Hills, Calif. 92653.

Controller Interfaces LSI-11/780s, Disks

SANTA ANA, Calif. — Emulex Corp. has introduced a single-board controller designed for interfacing a variety of 8-in. and 14-in. small- to medium-capacity hard-disk drives with Digital Equipment Corp. LSI-11/780 computers.

The SC02 controller comes initially in two models for emulation with specific DEC subsystems. The SC02/A emulates the RP11E controller combined with multiple RP02 and RP03 disk drives. The SC02/C emulates the RK611 controller combined with multiple RK06 and RK07 drives to support cartridge module drives.

The SC02/A controller costs \$2,500 and the SC02/C controller costs \$2,800.

Emulex Corp. is located at 2001 E. Deere Ave., Santa Ana, Calif. 92705.

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IBM License Pact Buoy PCMs

By Robert Batt

CW West Coast Bureau

PALO ALTO, Calif. — Plug-compatible manufacturers (PCM) in Silicon Valley were fairly buoyant last week following IBM's decision to make its licensed software available to users of non-IBM hardware.

The general feeling among the PCM vendors was that IBM had bowed to strong pressure from its user base to make more of its software productivity tools available as multivendor environments become more commonplace.

The agreement reached last week between National Advanced Systems (NAS) and IBM essentially guarantees identical IBM software licensee availability, support and installation aids to both IBM's own customers and users of PCM hardware.

NAS Delighted

NAS was delighted with the deal, according to David Martin, NAS marketing vice-president, who said, "In the past IBM has been amorphous on what it will do to support our customers. As a

result of this agreement, they have a specific policy and practice on how that will be done."

Martin claimed this development would have a positive effect on the plug-compatible environment by clearing up a lot of confusion. "In the past, many customers have been wary of going to non-IBM CPUs in case it meant giving up IBM software and support. Now the user is able to maintain the software benefits available from IBM," he added.

(Continued on Page 96)

Burroughs Office System Set This Month

By Marcia Blumenthal

CW Staff

NEW YORK — Burroughs Corp. will introduce an office automation system this month and by year-end will reintroduce the B3900, a previously announced product that has been on "indefinite hold" for the past several months.

In addition, the firm intends to augment its 900 series by unveiling B4900 and B7900 systems by early next year, Burroughs Chairman W. Michael Blumenthal told a meeting of security analysts here earlier this month.

The firm will also take the wraps off an entry-level multitasking, shared storage small business system by early next year, Blumenthal said. At that time Burroughs will have a very complete line of products, he emphasized.

The recent meeting was the second fete for analysts hosted by Burroughs this year [CW, Feb. 2]. This time Blumenthal shared the podium with his five top executives, an impressive showing of corporate executive muscle.

Financial Woes

During the past year Burroughs has had considerable difficulties, culminating in the year-end write-off of \$125 million that caused 1980 per-share earnings to drop to \$1.99, down drastically from \$7.45 per share in 1979.

Following last year's financial fiasco, Burroughs instituted a variety of major corporate realignments. Often criticized for stagnant senior management, Burroughs created an early retirement pro-

gram aimed at executives.

More than 260 managers have opted for early retirement, "mostly by mutual consent", Blumenthal reported. This has allowed the firm to move younger managers up more quickly, bring in new executives and eliminate some positions, Blumenthal told the nearly 200 analysts and members of the press attending the meeting.

Other Realignments

Making note of other major realignments, Blumenthal pointed to the creation of the Office of the President, the coordi-

nation of the marketing and engineering functions under the corporate product management unit, the bringing together of all computer system products under one product group and the formation of separate groups for office automation, communications and document handling products.

Document handling products were given group status last month and Blumenthal sees this as a major business area, noting a new \$70 million contract with the U.S. Post Office.

(Continued on Page 100)

UK OEM Poised to Invade U.S. With First TP Monitor for VAX

By Phil Manchester

Special to CW

LONDON — A Digital Equipment Corp. OEM here is about to make its first sortie into the U.S. computer market. However, it will not initially be selling hardware; instead, it will be selling what it claims is the only teleprocessing package in existence for the VAX-11 processor.

The firm is called Systime Ltd., and its product is called Systel.

Launched in the UK about 18 months ago, Systel reportedly provides much more than is traditionally associated with TP monitors.

As well as terminal handling and file processing, the package makes much use of the data dictionary concept and uses

this as the basis for many programming aids.

In the last year Systel has picked up 20 users in the UK and Holland. While this may seem low, Systime points out that the VAX market profile in Europe is different than in the U.S.

Systel is primarily a commercial package for business users, whereas most European VAX users are in the technical and computational fields.

"Including the newly announced VAX-11/750, DEC is moving about 60 to 70 machines a month in the VAX range," explained Systime marketing manager Ian Lund. "We have no doubts that VAX is the way that DEC is going."

(Continued on Page 96)

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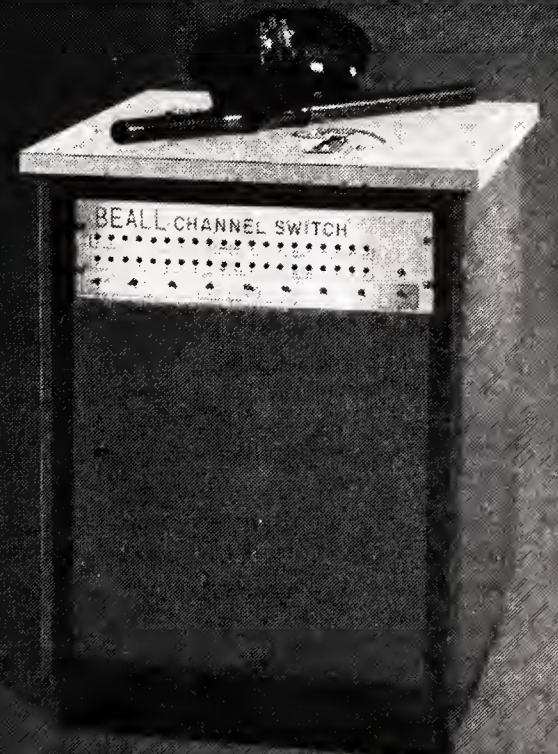
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COMPUTER INDUSTRY

STC to Buy Exxon Division

LOUISVILLE, Colo. — Storage Technology Corp. has reached an agreement in principle with Exxon Corp. to acquire for cash the Star Systems Division of Exxon Enterprises, which is a division of Exxon Corp.

Star Systems, which since 1978 has been developing optical systems for data storage and retrieval, is located in Pasadena, Calif. STC plans to move the 43-person operation to Louisville and combine it with STC's 75-person optical disk operation.

The amount of the proposed sale was not disclosed.

PCMs Pleased With IBM License Pact

(Continued from Page 95)

IBM's position as the dominant force in the computer industry led to the emergence of what became known as the FUD (Fear, Uncertainty and Doubt) factor. According to its competitors, IBM used the FUD factor to great effect in its code of practice for software and software support. If a customer was thinking of moving away from IBM hardware, he could not be sure of receiving IBM-compatible software, they claimed.

Last week, the PCMs were claiming that IBM's decision to make its System Installed Productivity Options (System IPOs) available to users, irrespective of the hardware, was a belated recognition of the facts of life.

Clay Marr, senior director of mar-

keting at Four Phase Systems, Inc. in Cupertino, Calif., said, "This decision by IBM demonstrates that it is not withdrawing its complete support from software run on non-IBM hardware. Rather, it is almost a recognition that, among other things, IBM is an independent software house. They are in the business of supporting software irrespective of the hardware and that is an important development for us."

Commercial Reasons

IBM itself claimed its decision was made for "good, solid commercial reasons. We recognize the evolving use of System IPOs as a key vehicle for installing IBM-licensed programs," a spokesman said.

That recognition, industry sources

said, came about only after prolonged pressure from IBM's user base, particularly its Fortune 500 customers, many of which operate in multivendor environments.

The advantage of having System IPOs available for non-IBM hardware is that it increases productivity dramatically by allowing programmers to carry out software system generation within a few hours instead of the several days needed without the use of the option. "Without this option, software revisions and updates are much more cumbersome," Marr said.

Wider Implications

However, according to the PCMs, the implications of the IBM decision go far beyond the technical issues surrounding productivity tools. "This understanding further establishes licensed software as a significant and separate stand-alone product brought about by the growth of the multivendor installation market. It means software can be looked upon as totally compatible and supportable in a multivendor shop just as are disks and peripheral products," Martin asserted.

The agreement, he said, would increase the number of customers who wanted to go into the PCM field, but previously saw software as the major roadblock to taking such a step. This would have long-term implications for companies like NAS.

UK OEM Set To Invade U.S.

(Continued from Page 95)

Although Systel also comes in a PDP-11 version — Systel 11 — Systime sees the VAX market as its main source of sales.

"VAX users are desperate for teleprocessing software," Lund said. "DEC cannot provide anything at the moment."

Lund added that the only packages presently available for the VAX in this area are run in "compatibility" mode, in which the VAX pretends to be a PDP-11.

Systime will be relying heavily on the British Government-backed software venture, Insac, for sales support and resources while it establishes itself in the U.S. Initially the company will concentrate its efforts on the East Coast, in New York and Washington, D.C., but hopes to be in California before the year is out.

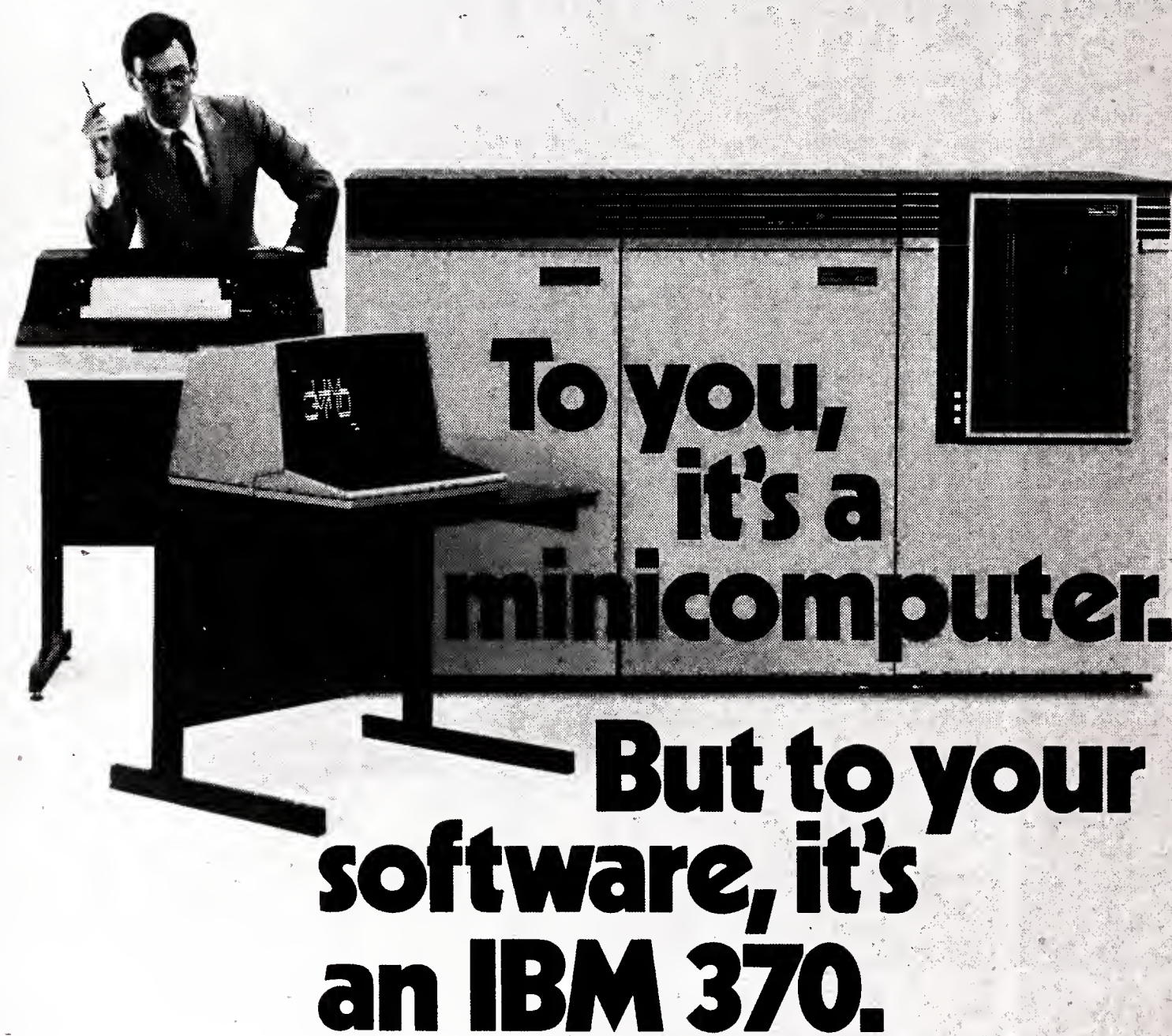
"We are looking to invest \$5.5 million in selling this product over the next five years," Lund said. The first phase of this marketing thrust begins this month with a \$300,000 advertising campaign. While this will be funded by the company itself, the source of the rest of the investment funding is yet to be resolved; it is likely that Insac will be involved.

Systime is hoping that the timely introduction of the Systel package will establish it sufficiently well to sell hardware in the U.S. in the future.

Systel runs under the VAX/VMS operating system and under RSX-11M on the PDP-11.

Manchester is an associate editor with Computerworld UK.

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PANSOPHIC

Sees 'Diminished Competition'

Alarm Sounds on DOD Procurement Changes

By Jake Kirchner
CW Washington Bureau
WASHINGTON, D.C. — Department of Defense (DOD) proposals for streamlining its procurement practices may lead to an increase in expensive, noncompetitive DP acquisitions, an industry association spokesman warned recently. — Jack Biddle, president of

the Computer & Communications Industry Association (CCIA), told a House of Representatives government operations subcommittee recently that provisions of pending defense authorization legislation would exacerbate DOD's already dismal record on competitive procurements. Addressing provisions to

remove the department from the procurement oversight of the General Services Administration (GSA), Biddle said "if approved it will lead to diminished competition in DOD procurements and substantially increase the government's data processing costs." Biddle said that even with GSA supervision most DOD

procurements for data processing resources are already conducted without competition. He cited DOD statistics showing that in fiscal 1980 72% of all DOD data processing contracts in excess of \$10,000 were awarded on a noncompetitive basis. Charging the 1980 figures were only slightly better than previous years', Biddle

claimed relieving DOD from GSA oversight "will increase tendencies that are all too present in the agencies to rely on noncompetitive procurements."

Increased Pressures

The issue has arisen because of increased pressures on DOD to get its procurement practices under control in the face of the large hikes in defense spending proposed by the Reagan White House.

In response, DOD has developed a number of suggestions for cutting the time and money needed to handle defense-related acquisitions. Chief among the proposals is increased use of multiyear contracts.

While few argue multiyear procurements would not save the government millions of dollars if handled correctly, more controversial is a DOD complaint that GSA-imposed procurement regulations are too complex and time-consuming for an agency charged with protecting national security.

In particular, DOD supporters have pointed to a 1980 Senate committee report suggesting cumbersome government procurement regulations played a part in computer problems of the North American Air Defense Command (Norad) [CW, May 27].

Using that report to justify its request, the Defense Department has sought an exemption from existing procurement statutes. The proposal has met stiff resistance in the House Government Operations Committee, whose chairman, Rep. Jack Brooks (D-Texas) wrote the book on federal DP procurement practices.

Poor Planning

In hearings last month, Brooks coaxed from federal oversight agencies and DOD itself the view that poor acquisition planning and systems management were at fault in the Norad snafus, not the procurement regulations.

Then, dealing out what for all intents and purposes was a stacked deck, Brooks convened the June 3 hearing to enter into the record the testimony of the General Accounting Office (GAO), the Office of Management and Budget (OMB) and the private sector, as represented by Biddle, backing Brooks' contention that what DOD needs is more, not less, competition in its procurement practices.

Brooks noted the OMB Of-
(Continued on Page 100)

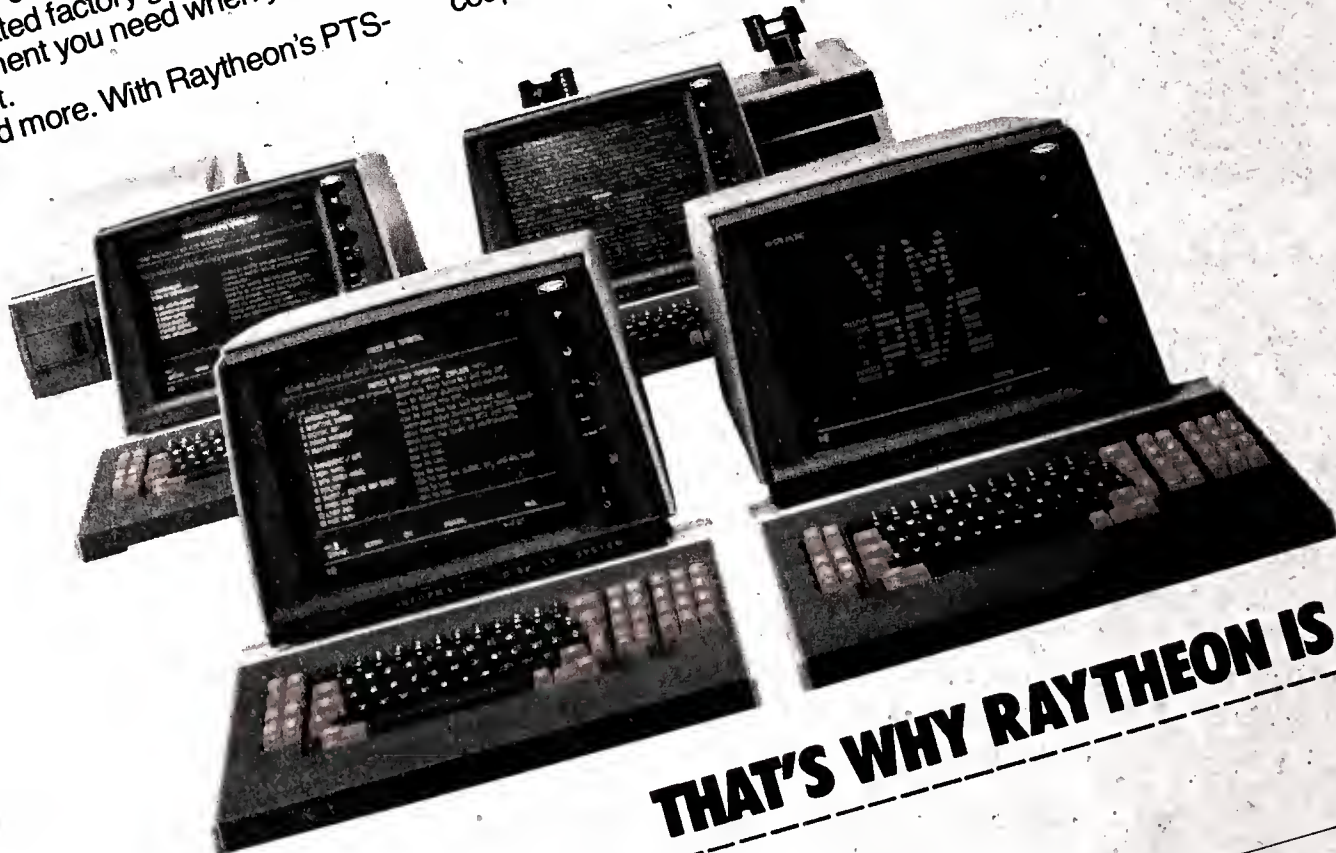
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Burroughs to Unveil Office System

(Continued from Page 95)

Moreover, communications products also represents another major group in which Burroughs is investing heavily. In the near future the firm will add X.25 support for its CP9500 communications processors that will allow "the company entry into competitive mainframe installations," according to Blumenthal.

"We have implemented future progress at the same time as we are running a company," he noted. "We are operating according to a plan." At the meeting last January Blumenthal noted Burroughs lacked the procedures and policies requisite for a \$3 billion company.

In other recent moves Burroughs has been consolidating its plants and

foresees additional plant consolidations. One of the major reasons for restructuring has been to reduce overhead, which in some cases has already been diminished by 35%, noted Thomas E. Winter, executive vice-president for finance and administration.

As for the company's bottom line, Winter forecast revenue growth of 20% to 25% during the second half, which would allow Burroughs to finish the year with an overall revenue growth rate "in the teens." Both Blumenthal and Winter said they did not want to forecast earnings, but noted if the firm could match 1980's prewrite-off earnings of \$5.02 per share, the year would be considered fruitful.

Burroughs: 99.9% Of B800s OK

NEW YORK — Suits involving Burroughs Corp.'s B800 system involve a "very tiny fraction" of total units installed, Michael Blumenthal, the firm's chairman, said in response to a question at a recent meeting here for security analysts.

Blumenthal said the issue of suits involving B800 systems had been blown out of proportion by the press. "We have about 8,000 B700s and B800s installed, and 99.9% are working very well," he added.

Although some cases have been settled, Blumenthal maintained no misrepresentation was made in the sales of those systems.

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DOD Changes Under Fire

(Continued from Page 98)

fice of Federal Procurement Policy (OFPP) is under a congressional mandate to develop a uniform procurement system for the entire government and argued the proposed defense authorization legislation could set up "a separate procurement system for DOD at variance with policies for the government as a whole," Brooks said.

Representing GAO, Thomas D. Morris, special assistant to the comptroller general, agreed with Brooks that DOD data processing acquisition policies and procedures "should be considered along with the unified procurement statute being developed by OFPP. Hence, any legislation dealing with this matter at this time would be premature," Morris said.

OMB Supports View

That sentiment was further supported by OMB, whose deputy director, Edwin L. Harper, told the subcommittee "we do not believe that the problem is in the acquisition process itself, but rather a lack of adequate planning."

Harper said "we especially support full and open competition in the provision of federal information technology systems. Furthermore," he said, "we believe the [current] law provides sufficient flexibility to adopt to changing technologies and institutional arrangements."

Having thus enlisted the backing of the White House's own budget forces, Brooks was armed to continue this small skirmish in the larger campaign surrounding the \$136 billion defense authorization bill.

While Brooks contends "everything possible must be done to ensure that this money is wisely and efficiently spent," the CCIA's concerns are no less pragmatic.

CCIA President Biddle suggested relatively small high-technology companies have the most to lose if the authorization bill allows increased sole-source defense contracting. The small firms, such as those his association represents, "cannot afford to have large sales forces pounding the streets in Washington for sole-source business," Biddle noted.

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Boole & Babbage Primed for Rapid Growth

By Robert Batt

CW West Coast Bureau

SUNNYVALE, Calif. — Anyone who makes the regular round of computer industry conferences, exhibitions and seminars cannot fail to notice the increasing prominence given to such software-oriented topics as management information systems (MIS) managers' struggle to increase productivity.

With the shortage of skilled programmers at the highest level now regarded by many as the No. 1 problem facing the industry, more and more users are turning to packaged software as the answer to their needs. In this environment, software

specialists are carving out an ever more lucrative niche as they tie themselves to the coattails of major hardware manufacturers.

One company that seems fairly well set for a rapid period of growth as a result of these developments is Boole and Babbage, Inc., which specializes in the areas of information management, capacity management and productivity enhancements for IBM and IBM-compatible products.

Founded in 1967, Boole & Babbage is now a \$14 million company that targets its products at the high end of the market — machines of one million instructions per second such as the IBM 30 series, the 4341 and Am-

dahl Corp. equipment.

The company currently offers 10 products; three more are scheduled to be launched this year and early in 1982. Boole & Babbage's products are divided into three categories:

- Capacity management tools designed to allow the user to fine tune the system for better performance. Products in this category include Resolve, a real-time performance management tool, and the Comprehensive Management Facility (CMF), designed for IBM's MVS operating system.

- Information management tools designed to help the user to control specific job-related data in the ac-

counting and security areas working particularly in IBM's CICS and IMS environments.

- Productivity tools, which Boole & Babbage claims allow dramatic increases in programmer productivity and enables the user to find and fix inefficiencies in individual programs. Included in this category are products such as VAM/SPF, an application monitor used with IBM's Vtm product.

According to Jack E. van Kinsbergen, Boole & Babbage president, the computer services market is now worth \$600 million. Within the operating system segment, IBM's DOS accounts for 64% of the market and OS accounts for 36%. Boole & Babbage is concentrating its activities in the OS marketplace.

Set for Growth

Boole & Babbage is set for a period of significant growth, its president said, because it is positioned in IBM's biggest market and because, with 11 sales offices in the U.S. and eight in Europe, it has the structure in place to become a much bigger company.

"MVS and IMS in particular are growing fast. More and more of IBM's marketplace is going to standardize around these two products. The more work users put on their machines, the more management tools they need," he said.

Since van Kinsbergen took over Boole & Babbage's helm last year after a distinguished career in design at IBM and then as vice-president of Citicorp Management Services, Inc., the company has concentrated on adopting a coordinated product strategy. "For a long time, the company has been unable to capitalize on its assets because it never had a product strategy. Until recently, a fundamental strategy was missing," van Kinsbergen said.

This, he claimed, was because of the slow acceptance of MVS and IMS by users. "When I came here there were nine separate products that did not truly relate to each other and the company had not introduced a new product in three years."

Over the last year, Boole & Babbage has concentrated on drawing its product base together with a great deal of emphasis on capacity management and improving its productivity tools. Now the company claims it is the only one to have made a full commitment to provide all the pieces in the capacity management field; is out on its own in the IMS area; and in programmer productivity it has the capacity to take what IBM has done and make it run more efficiently.

Boole & Babbage claims that the recent addition of CICS to its Resolve package and enhancements to its CMF capacity management tool are evidence of growing synergy between its products.

With the company growing at around 30% a year and with a client base of about 2,000 customers, it could be that even with such a cautious strategy, Boole & Babbage could achieve its objective of being a \$100 million company within the next five years.

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After Nine Months in Business

Start-Up Venture Raises \$6.2 Million in Cash

By Robert Batt

CW West Coast Bureau

MENLO PARK, Calif. — With the high cost of borrowing and tough competition, would-be entrepreneurs in the computer field are finding it increasingly difficult to start up ventures from scratch.

So when a small group of DP professionals without a product in the field manage to persuade some of the nation's top financial investment institutions to come up with \$6.2 million in cash after just nine months in busi-

ness, people are inclined to sit up and take notice.

That is exactly what has happened in the case of Synapse Computer Corp., an enterprise based here that plans to develop products for high-throughput transaction processing. Eight investors — including such prestigious institutions as Hambrecht and Quist of San Francisco, Bessemer Ventures of New York and a venture capital group being formed by L.J. Sévin, founder of Mosstek, Inc. — agreed last month to support Synapse.

Synapse was founded last September by Mark Leslie, former Western area director for Data General Corp., and Elliot Nestle, former director with Perkin-Elmer Corp. Computer Division (Interdata). Although the company is naturally reluctant at this early stage to give details of specific products, Leslie, now company president, made it plain Synapse was playing for big stakes.

"Synapse is in the business of manufacturing a high-data-integrity, high-performance computing resource

that uses the latest hardware and software systems architecture to economically support a large number of terminals. We are not going to go into general areas such as supporting a process control or batch processing environment. Instead, our plan is to do an excellent job in a particular niche of the market and make ourselves the leader in transaction processing, rather than just another computer company," he said.

The company wants to build a family of applications in mid-range computer systems with a high degree of focus on doing one thing well, Leslie said. The needs of transaction processing included the requirements of high availability, a high degree of data integrity and the ability to accommodate various types of applications such as the need to be data intensive.

Avoiding Head-On Rivalry

Since its formation, Synapse has been repeatedly linked with the Tandem Computers, Inc. Nonstop processing market, but Leslie stressed the new company would not be fixing its sights on any one competitor.

"Although Tandem is involved in the world of transaction processing among other things, I do not consider we are going head-on against them. The market is changing so rapidly that it would be presumptuous to say who our competitors would be, but we think the market we are aiming at can be served better than it is today," he said.

Synapse said its focus is on the Fortune 500 companies and that the products it will manufacture are designed to be cost-effective over a wide

range of capabilities, both in regard to the number of terminals and in the size and complexity of the data base. A high degree of functionality, system availability, data integrity and configuration modularity are among the features promised.

Leslie has placed his faith in a group of 35 systems and design engineers recruited from about six companies in the Silicon Valley area. "We thought it was important to get a variety of influences and experience because in creating this new company we wanted people who had an awareness of the strengths and weaknesses of the organizations they formerly worked for.

"Our aim has been to choose people who could build on those strengths and eliminate the weaknesses. In that sense, we are not modeling ourselves on any particular company now existing, and we feel we have put together an outstanding technical team of senior people from the industry leaders," he said.

Certainly the company has been able to call on some impressive figures in the DP industry to help launch the enterprise. The original investors, who put in \$1.8 million to start the operation, included Jesse I. Aweida, founder of Storage Technology Corp.

Leslie stated, "The investors know all about our plans for the market, they know our strategy, product offerings and the risks involved. That they have been willing at this stage of the company's life to come up with substantial funds for development is a strong endorsement."

Time will tell if their judgment is correct.

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Supershots

Vitalink Communications Corp. has purchased from Amdax Corp. exclusive worldwide manufacturing and marketing rights for the American Modem satellite and line-of-sight microwave product lines.

Construction of a \$5.1 million earth station and associated facilities to link the Miami area to its nationwide satellite communications network has been announced by RCA American Communications, Inc.

Wespercorp, Inc. has announced the formation of its subsidiary Wesper International, located in Tustin, Calif. In conjunction, a branch office of Wesper International has been established in England to service the UK and Western Europe.

The Information Products Division of Sanders Associates, Inc. has received the Supplier Superior Performance Award from Hughes Aircraft Co.'s Space and

Communications Group. The award is for the implementation of a graphics support software language that enables various host computers to talk to different types of display terminals in a terminal independent network.

Lockheed Corp.'s Dialog service, reportedly the largest on-line information retrieval service in the world,

became a subsidiary of Lockheed June 1. Known as Dialog Information Services, Inc., it is under the direction of Dr. Roger K. Summit.

Michael Minikes, general partner and treasurer of Bear, Stearns & Co., was elected to a two-year term on the board of directors of the Securities Industry Automation Corp. (Siac) at the annual organiza-

tion meeting. The board also reelected Leland H. Amaya Siac chairman and chief executive officer.

Venture Development Corp. (VDC) has formed a Communications Consulting Division to provide marketing and planning advise to the telecommunications and data communications industry. Heading the new group

will be Edward A. Ross, a senior consultant at VDC since 1974.

Control Data Corp. recently announced a reorganization of its aerospace division in Minneapolis. Roger E. Handberg, former general manager of AN/AYK-14 computer programs, has been named general manager of the division.

Mergers & Acquisitions

In a move designed to strengthen its capability to provide software and hardware tools to users of DEC LSI-11s and minicomputers, Omnex Corp. has acquired the consulting firm of Menlo Computer Associates, Inc.

UTG, a New York City-based holding company, has sold Alanthus Corp. to a group of investors headed by Jerry Minsky, Alanthus' president.

The First National Bank of Boston and Diebold Computer Leasing, Inc. have signed a letter of intent by which one of the bank's subsidiaries, acting through Randolph Computer Co., will acquire certain of the computer assets of Diebold for roughly \$5 million.

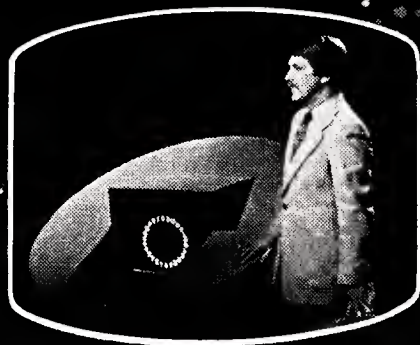
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And that's just the beginning. Each week "Computerworld" lets you take a step back from the trees to look at the forest. It lets you see, hear and experience the effect of computers on medicine, sports, law, business, crime, personal privacy, personal growth and much more. We cover failures as well as successes; problems as well as progress.

Computerworld for television also provides perspective on the continuing rapid technological changes in computers. Where is technology today? Where might it be tomorrow? What significant new products are becoming available? How is the industry changing and what is the impact of that change?

And, we aren't forgetting the lighter side. We'll be covering a computerized adult game that helps you improve your sex life. Or the latest in computerized entertainment. We have commentary on some of the pitfalls and problems of dealing with computers — both as expert and customer.

There's much more to "Computerworld" for television, but we can't go into it all. We invite you to find out for yourself. Join the experts and interested laymen who are enjoying and benefiting from this unique new television experience. Right now, we cover 13 major TV "ADI's" (Areas of Dominant Influence), which include about half the computer people in the U.S., and we have plans for expansion in the fall.

FCC's Inquiry II Slammed at House Hearing

By Phil Hirsch

CW Washington Bureau
WASHINGTON — The Federal Communications Commission's (FCC) Computer Inquiry II decision came in for heavy criticism at a recent hearing convened by the House of Representatives Telecommunications Subcommittee.

The stated purpose of the gathering was to educate the subcommittee's members,

many of whom are newly appointed, on the status of competition and deregulation in the telecommunications industry, explained Chairman Tim Wirth (D-Colo.). However, critics of Computer Inquiry II saw it as a tutorial of a different kind.

Tom O'Rourke, president of Tymshare, Inc. of Cupertino, Calif., was among the most outspoken critics.

Appearing on behalf of the

Association of Data Processing Service Organizations, Inc. (Adapso), O'Rourke said, "The entire computer time-sharing industry has been made apprehensive by the FCC's decision to let AT&T, the principal supplier of our lifeblood, compete directly against us in information services. I can think of no other industry where this situation exists."

AT&T, because it supplies

the industry's communications, "has access to our customer lists, and they have their own personnel physically present in our time-sharing facilities for maintenance purposes," O'Rourke pointed out.

The "growing scarcity of private-line and other telecommunications services" poses another threat, O'Rourke indicated. If the phone company establishes a

separate subsidiary offering time-sharing services, as is permitted under Computer Inquiry II, AT&T operating companies could favor the subsidiary over its competitors in providing circuits and responding to service calls.

Adapso has been arguing for a long time to the FCC and Congress that if AT&T is allowed to branch out into the computer services business in direct competition with Adapso members, it must be required to establish maximally separated subsidiaries — that is, separate profit centers with separate trade names, accounts, personnel and facilities.

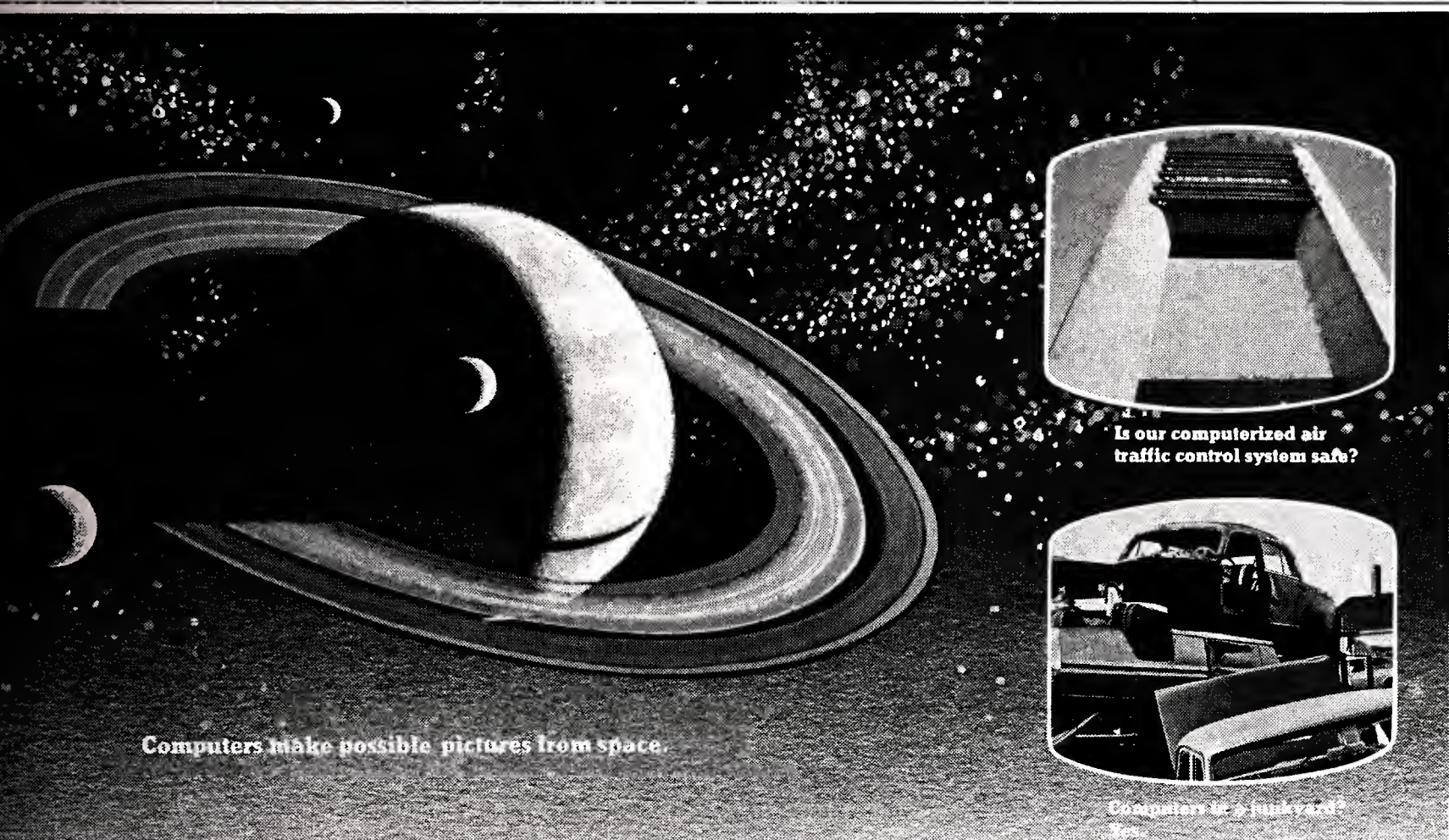
The decision, as adopted by the commission, falls short of this standard in several ways, according to both O'Rourke and Dr. John Wilson.

Representing Foes

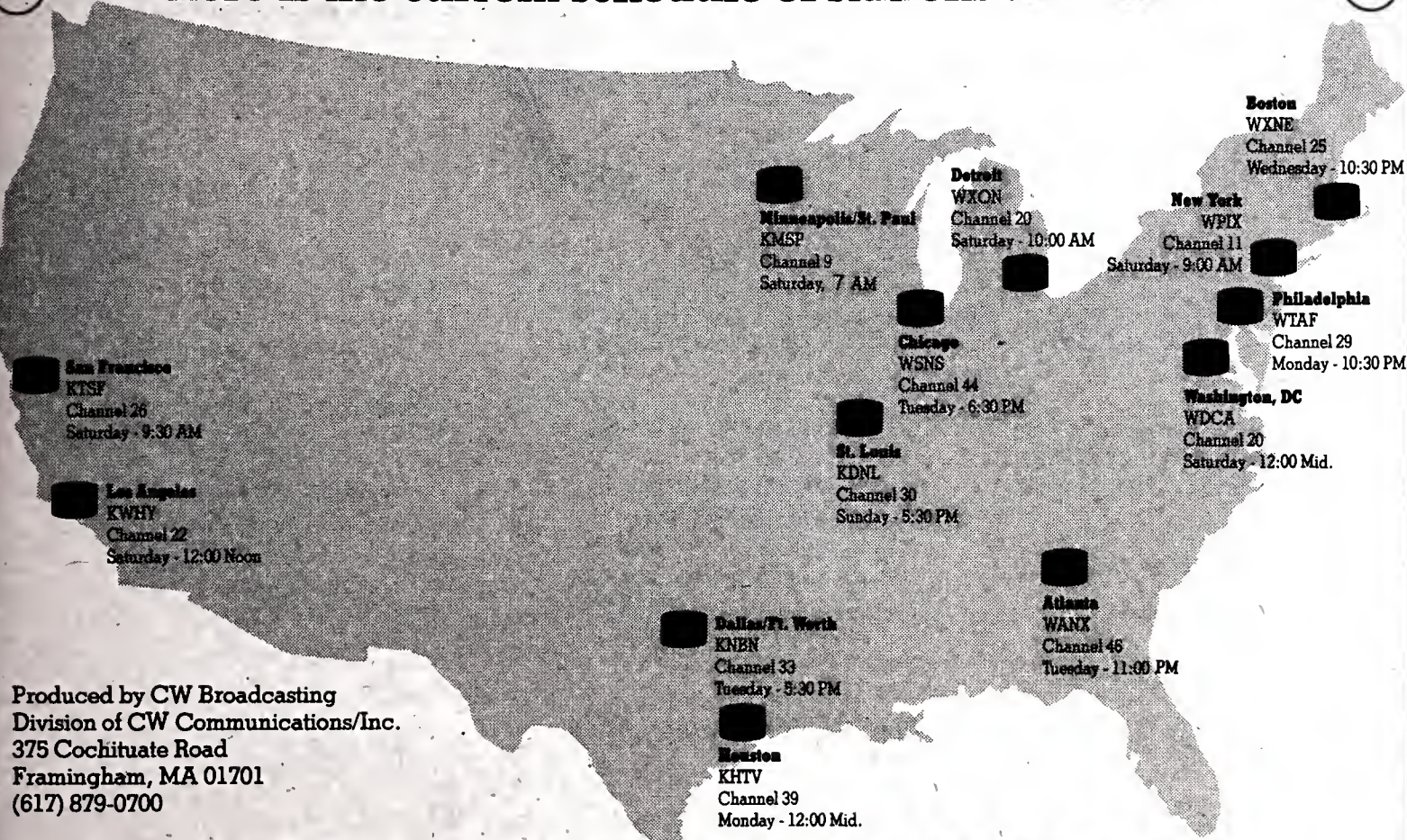
Wilson, a private economist, appeared before the Wirth subcommittee on behalf of three other foes of the Computer Inquiry II decision — Computer and Communications Industry Association (CCIA), Independent Data Communications Manufacturers Association (IDCMA) and North American Telephone Association (Nata).

"Under the Computer II framework, there is not sufficient separation of deregulated activities from regulated services to prevent [cross subsidy] of marketing, research, manufacturing, installation and maintenance of products," Wilson said. Nor is there sufficient protection against "the manipulation of accounting systems ... and the cross-subsidy cake is handsomely frosted with joint advertising and market image building," he said.

Carrier control of the network "remains one of the single most critical barriers" facing independent terminal makers who compete with Western Electric, Wilson said. The Computer Inquiry II decision does not require AT&T "to publish technical information [concerning] revised standards and protocols before carrier-furnished equipment is first distributed to the marketplace."



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Nickels & Dimes

Wang to Redeem Some Debentures

LOWELL, Mass. — Wang Laboratories, Inc. intends to call for redemption on July 2 all of its 9% convertible debentures due 2005, the total principle amount of which is about \$99 million.

Those debentures will be convertible to the firm's Class B common stock at \$32 per share. As long as Wang's Class B stock has a market value of more than \$36.056 a share, debenture holders will receive a stock value greater than they would gain through redeeming the debentures.

By calling the debentures, Wang intends to improve its ratio of debt to

equity and reduce its interest costs, the firm said.

The firm has filed a registration statement with the Securities and Exchange Commission covering the issuance of a maximum of 3,092,000 shares of Class B common stock.

Merrill Lynch, Pierce, Fenner and Smith will head the investment bankers purchasing the debentures redeemed for cash.

Other Moves

Comserv Corp. has approved a three-for-two stock split in the form of a 50% stock dividend payable June 1. The company has also filed a registration statement with the Securities and Exchange Commission for the public offering of 400,000 shares of

common stock to a group of underwriters led by Piper, Jaffray and Hopwood, Inc. The purchase of shares will be made on a presplit basis.

\$\$\$

Management Science America, Inc. is offering 1.5 million shares of its common stock at \$16 per share. Proceeds from the sale will be used for retirement of indebtedness, working capital and possible acquisitions to expand the company's business.

\$\$\$

Datapoint Corp. is planning an underwritten public offering of \$100 million of convertible subordinated debentures.

Computer Installations Corp. has declared a cash dividend of five cents per share on its outstanding shares of common stock, \$1 par value per share, payable June 15 to holders of record May 31.

\$\$\$

Hewlett-Packard Co.'s board of directors has declared a two-for-one split of the company's common stock and a regular quarterly cash dividend of six cents per share. The split is effective on common shares outstanding June 17.

\$\$\$

Telecom Systems Group, Inc. has completed an agreement with a private group of investors to provide the company with \$2,200,000 in additional capital in exchange for a minority percentage of the company's common stock.

\$\$\$

Interaction Systems Inc. has completed an initial public offering of \$50,000 shares of Class A common stock at \$4 per share. Total proceeds to the company were \$2,035,000.

\$\$\$

Wang Laboratories N.A., N.V., a wholly owned Netherlands Antilles subsidiary of Wang Laboratories, Inc., plans to offer \$50 million worth of 15-year subordinated guaranteed convertible debentures outside of the U.S.

\$\$\$

A public offering of 700,000 newly issued shares of common stock of Computer and Communications Technology Corp. was recently made at a price of \$44 per share.

\$\$\$

General Instrument Corp. has voted to split the common stock three for one by means of a stock dividend.



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Expansions

Calma Co. of Sunnyvale, Calif. will move its Operations Division to the company's Milpitas, Calif. facility. The initial phase of the building includes 104,000 sq ft, with another 168,000 sq ft to be completed by early fall.

Hewlett-Packard Co. has exercised its option to purchase the majority of its 133 acres on Soper Hill Road near Lake Stevens, Wash., as the permanent site for an electronics plant.

Augat, Inc. formally dedicated corporate headquarters during ceremonies in Mansfield, Mass., last week. The structure is located on a 4.4-acre site in the Interstate 95 Industrial Center off Rt. 1495.

Symcro Systems, Inc. has consolidated its headquarters and its computer development and manufacturing operations in a 5,000-sq ft building at 7300 Crescent Blvd., Pennsauken, N.J.

Stanford Applied Engineering plans to open its new manufacturing facility in Santa Ana, Calif. on July 1.



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Orders & Installations

Lundy Electronics & Systems, Inc. has received an order from Commonwealth Edison Co. for 247200 optical character recognition (OCR) document readers and associated maintenance valued at \$872,157.

Toyota Motor Sales U.S.A., Inc. has signed a \$15 million contract for the purchase of computer equipment from IBM that will link the company with its dealers to provide instantaneous answers

for customer questions, including new vehicle and parts availability and how to finance a purchase.

Roaman's of New York has recently signed a contract worth more than \$600,000 with STS Systems Ltd. for a retail computer system.

The Los Angeles Times has agreed to buy a computerized news editing system from Systems Integrators, Inc. for \$8.4 million.

General Dynamics Corp. has expanded its data processing system with the installation of its fifth Tandem Computer, Inc. Nonstop computer at the company's aircraft manufacturing complex.

Denelcor, Inc. has received two orders for its Heterogeneous Element Processor computer system, base-valued at \$1.5 million. Cornell University and the University of Georgia Research Foundation placed the orders.

The First National Bank of Atlanta and Telecredit, Inc. have signed a letter of intent to purchase the bank's "Honest Face" check-verification system for an undisclosed amount.

Brown University's Department of Computer Science will purchase 20 personal computers from Apollo Computer, Inc. for the development of a computing environment for classroom instruction in computer science.

American Satellite Co. has been awarded a \$16 million contract by Federal Express for installation and operation of the world's first private satellite communications network using 64M-bit full-transponder time division multiple access. The contract is for an initial five-year period with service scheduled to start in mid-1982.

Modular Computer Systems, Inc. has been awarded a contract valued at more than \$2 million by Maine Yankee Atomic Power Co. to provide a network of four Classic 7870 CPUs and a large Modacs III to perform front-end processing at the company's Wiscasset, Maine, plant.

Scientific-Atlanta, Inc. has received two orders valued at approximately \$1.2 million for Model 3055M Marisat satellite communications terminals from Texaco, Inc. and Phillips Petroleum Co. Texaco has ordered 11 communications terminals to be placed on its tankers used in U.S. Gulf and international service. Phillips has ordered 10 shipboard terminals to be used for equipping tankers in its international fleet.

The Los Angeles Department of Recreation and Parks has purchased the local government financial system — a package system designed specifically for the accounting and financial reporting requirements of lo-

cal governments and municipal agencies — from American Management Systems, Inc. The department will use the system for an automated municipal sports-accounting system.

Union Trust Co. of Connecticut has ordered a system of electronic terminals and minicomputers to be installed by Bunker Ramo Corp.'s Information Systems Division. Bunker Ramo is supplying the company with four units of its Bank Control System 90 equipment, which has been developed for retail banking operations.

Sperry Univac has received several orders for its System 80 computer. The following companies have ordered the system: Rusco Industries, Cochran, Pa.; King Motor Co., Fort Lauderdale, Fla.; ICC Data Processing Commission, Jefferson, Wis.; Middletown Area School District, Middletown, Pa.; Sandhills Community College, Southern Pines, N.C.; Gaer Brothers, South Windsor, Conn.; and

Carolina Eye Associates, Southern Pines, N.C.

Woods Petroleum Corp., Oklahoma City, Okla., has installed a Honeywell, Inc. Page Processing System valued at about \$200,000.

Datapoint Corp. has received 12 orders and letters of intent for its ISX Information Switching Exchange. Among the companies placing orders with Datapoint are Banco Mortgage Co., Compugraphic Corp., United Services Automobile Association, McDermott, Inc., Datel Communication Systems, Inc., Teletec Saving Communications Co., and Tel Systems Management Corp.

Certified Resources Corp. of Dallas has entered into a contract with Noble Builders, Inc. for the purpose of developing and installing a property management system. The company has also signed a contract with Transit Services to develop and install a vehicle routing system.



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VISUAL 100 (COMPATIBLE W/DEC VT-100)	QUOTE
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	LA34 DECwriter IV Forms Ctrl.	1,095	105	58	40
	LA120 DECwriter III KSR	2,295	220	122	83
	LA120 DECwriter III RD	2,095	200	112	75
TEXAS INSTRUMENTS	VT100 CRT DECscope	1,595	153	85	58
	VT132 CRT DECscope	1,995	190	106	72
	TI745 Portable Terminal	1,595	153	85	58
	TI765 Bubble Memory Terminal	2,595	249	138	93
	TI Insight 10 Terminal	945	90	53	34
DATAMEDIA	TI785 Portable KSR, 120 CPS	2,395	230	128	86
	TI787 Portable KSR, 120 CPS	2,845	273	152	102
	TI810 RD Printer	1,895	182	102	69
	TI820 KSR Printer	2,195	211	117	80
	DT80-1 CRT Terminal	1,695	162	90	61
LEAR SIEGLER	DT80-3 CRT Terminal	1,295	125	70	48
	DT80-5L APL 15" CRT	2,295	220	122	83
	ADM3A CRT Terminal	875	84	47	32
	ADM31CRT Terminal	1,450	139	78	53
	ADM42 CRT Terminal	2,195	211	117	79
HAZELTINE	1420 CRT Terminal	945	91	51	34
	1500 CRT Terminal	1,095	105	58	40
	1552 CRT Terminal	1,295	125	70	48
	920 CRT Terminal	895	86	48	32
	950 CRT Terminal	1,075	103	57	39
TELEVIDEO	Letter Quality, 55-15 RD	2,895	278	154	104
	Letter Quality, 55-25 KSR	3,295	316	175	119
	Letter Quality KSR, 55 CPS	3,395	326	181	123
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Executive Corner

• Jack H. King has been appointed president and chief operating officer at Data Electronics, Inc.

• Alfred J. Romagnolo has recently been named president and chief executive officer at Peer Services, Inc.

• Herbert S. Amster, formerly vice-president of finance and chief financial officer at Sycor, Inc., has joined Irwin International as executive vice-president and chief financial officer.

• Joseph A. Filipelli Jr. has been named vice-president of divisional development at National CSS, Inc.

• Storage Technology Corp. has announced the promotion of Clifford F. Moss to corporate vice-president of domestic field engineering operations.

• David G. Carr has joined Minicomp Corp. to fill the newly created position of vice-president of finance.

• David Beamer has been named vice-president of marketing for Amdahl Corp.'s north central region.

• John J. Christman has joined Data-Royal, Inc. as executive vice-president, a newly created post.

• California Computer Products, Inc. has announced the appointment of Richard L. Manis to the newly created position of vice-president of quality assurance in the Graphics Products Division.

• Whitney Haney has been named vice-president of distributed data terminals for Harris Corp.'s Data Communications Division.

• John Benbow has been appointed vice-president of research and development at Calma Co., a General Electric Co. subsidiary.

• Charles Kempton has joined Ohio Scientific, Inc. as vice-president of sales and service.

• James A. Barth has been named senior vice-president of finance and chief financial officer of Magnuson Computer Systems, Inc.

• Frank J. Reinhart has been appointed vice-president of engineering at Microdata Corp.

• Ramtek Corp. has promoted Tony Glinskis to vice-president of sales and Michael Gordon to vice-president of software development.

• Master Data Center, Inc. has announced the promotions of Lawrence Freedman to senior vice-president, Elizabeth Bevier to vice-presi-

dent of operations and Pamela Carey to secretary-treasurer.

• Arthur R. Ekroos has been appointed vice-president of engineering at Alta Technology, Inc.

• Alan Walter has been appointed assistant vice-president of computer communications business development at The Computer Communications Group of the Transcanada Telephone System. Michael S.G. Corlett has been named general manager for Toronto and Western Ontario and David Durnford has been appointed general manager of sales for Ontario region marketing, Bell Canada.

• Charles A. Shaffer has been named director of the Management Services Division of Basic Datasystems, Inc.

• Geoffrey Salkind has been appointed general manager of the Commercial Systems Division of Computer Automation, Inc.

• Ronald P. Quake has been promoted to president of the information technology group of Indian Head, Inc. and elected an executive vice-president of the company.

• Bob Bernardi has been named president of the Santa Cruz Division of Plantronics, Inc.

• Bert McAllister, former vice-president of software development, and Dave McTaggart, previously vice-president of hardware development, tendered their resignations as officers and directors of the Hetra Co. James Willmann, who recently joined Hetra, will assume McTaggart's and McAllister's responsibilities.

• At Timeplex, Inc., David P. Barnhill has been appointed vice-president of finance and administration, and Robert B. Wright was promoted to senior vice-president and assistant to the president. Both are moving into newly created positions.

• John E. Salikis has joined SEI Corp. as vice-president of systems and product development.

• Robert Schwebel and Jerry Gallagher have been named vice-presidents of Teleram Communications Corp. Schwebel has been appointed vice-president of marketing and Gallagher was named vice-president of sales worldwide.

• DMC Systems, Inc. has announced the recent appointment of Philip M. Lumish as vice-president of marketing.

• Vincent Donovan has been promoted to vice-president of customer and marketing support at Sperry Univac.

Univac Revamps

BLUE BELL, Pa. — Sperry Univac has announced the formation of two groups within its Product Division in a move the company said is designed to provide a unified strategy in meeting the demands of minicomputer users in distributed data processing environments.

The Communications and General Systems Group will integrate the manufacturing operations of the Communications and Distributed Systems Division and the General Systems Division and will be headed by Neil Gorchow, vice-president and general manager.

The Communications and General Systems Group will be headed by Donald O. Neddenriep, vice-president and general manager, former vice-president of customer and marketing support.

In addition, the company announced that H. Glen Haney has been appointed to the newly created position of vice-president of strategic planning and development, reporting directly to the president of the company.

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Lead development of NEW business systems. Requires 5 years experience of systems analysis and programming in IBM OS/MVS systems with COBOL or ALC. A stable job history and at least 3 years of successful user interface, systems analysis and programming of multiple applications are required. CICS experience highly preferred.

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Dallas firm seeks a Senior Programmer and a Programmer/Analyst with 1-4 years OS COBOL. Experience with accounting and/or financial systems is required. Positions offer extensive design and development involving user contact and analysis with the senior position requiring very little programming. IMS or CICS experience required.

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SYSTEMS ANALYSTS AND PROGRAMMER ANALYSTS to \$32,000

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DATA CENTER EXPANSION to \$41,000

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DENVER

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Real-Time Control Systems to \$40,000

Develop real-time oil and gas production control systems in Alaska using FORTRAN and Assembler on TRW and MOD-COMP computers. Technical degree and 3+ years of current experience is required.

Reno, Nevada to \$24,000

Develop statistical analysis systems for the gaming industry using FORTRAN and BASIC on DEC PDP 11/70 and VAX computers. 30% travel. Requires as little as one year of experience.

Systems Programmer \$26-\$37,000

Multiple openings in Colorado and Arizona for IBM OS/MVS and DOS/VSE Systems Software Specialists with CICS, BTAM, DL-1, or IMS experience. Solid teleprocessing experience is in heaviest demand.

Programmer Analyst to \$29,000

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Ft. Collins, Colorado \$20-\$32,000

Multiple openings for IBM COBOL/CICS or RPG II programmers and systems analysts with major company converting from an IBM System/3 to IBM 3031 DOS/VSE and CICS systems. Plans are to move to OS/MVS this fall.

IBM COBOL/ALC/PL-1 to \$28,000

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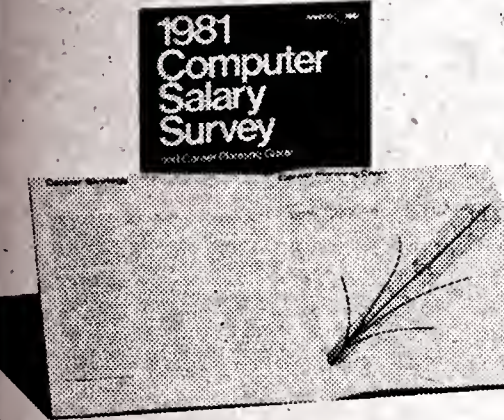
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You will be responsible for producing user manual documentation. You should be able to write clear, standardized effective policy and procedures manuals for new and existing MIS systems.

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You will define, develop and maintain MIS test environment, and provide tools to facilitate testing process, as well as train MIS staff in the use of test environment and tools. This QA position will also provide technical assistance in areas relating to OS/VS JCL and utilities, and evaluate and define system development libraries and associated standards and procedures.

You should have seven years in DP Application Development or support using COBOL, JCL, utilities. You should also have at least three years IMS DB/DC experience, and extensive experience on IBM 360 with OS/VS/MVS environments.

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You will work with our Senior Systems analyst to design, develop and implement, as well as maintain and support systems in order processing, business analysis, purchasing and receiving.

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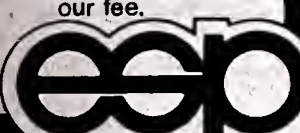
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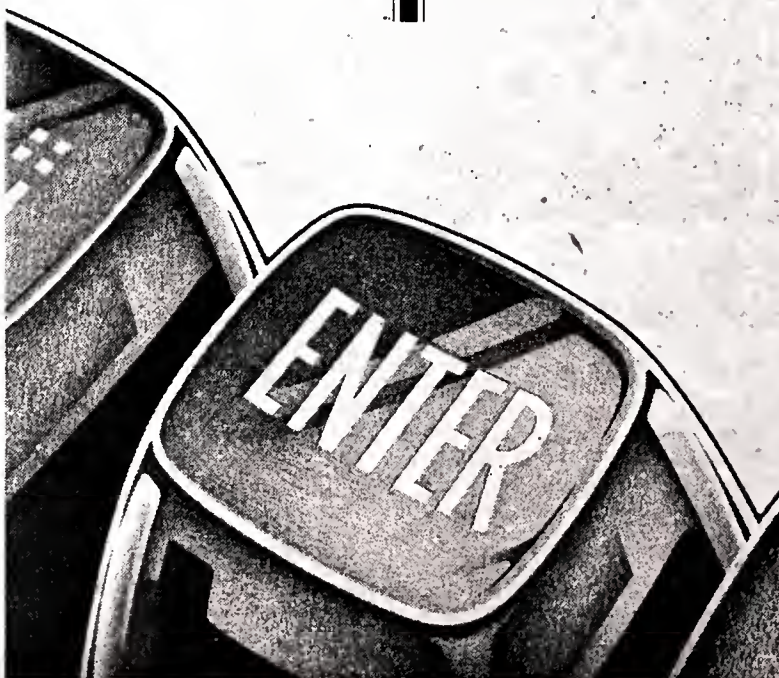
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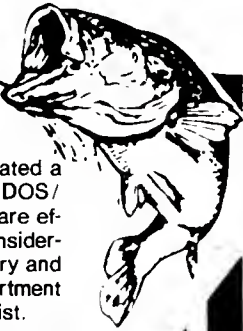
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We have immediate opportunities for a Senior Operations Analyst, Applications Analyst Programmers, Systems Programmer Analyst, Data Base Analyst and Teleprocessing Specialist. Your background should include experience in compatible systems and illustrate your ability to constantly learn new data and accept responsibilities.

You don't need a "revolving door" to get ahead any more. Please send your resume to The Federal Reserve Bank of San Francisco, 400 Sansome Street, Personnel Department C, San Francisco, CA 94111. We are an equal opportunity employer.

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International mfr in Phila western suburbs seeks 4 yrs COBOL pgmg exp for their IBM 370/158 OS/VS1. Qualified candidates will possess excel communication skills to interface w/inl dept. All fin'l apps. Top Benefits incl BONUS.

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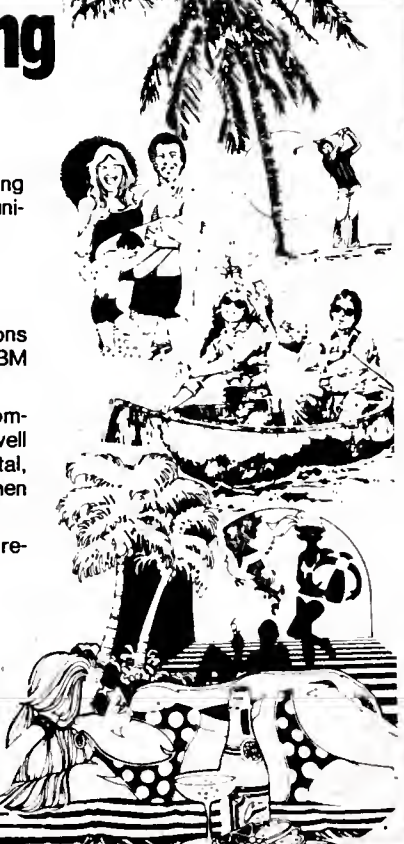
You must have a minimum of four (4) years programming experience on applications such as savings, DDA, Consumer and/or Mortgage Loans utilizing NCR NEAT 3, IBM Assembler or a comparable language.

In addition to the opportunity for professional growth, we can offer you a highly competitive starting salary fully commensurate with your experience and expertise, as well as a generous benefits package including relocation expenses, annual bonus, dental, medical and life insurance coverage and five year vested retirement plan. And then there's Florida with its superior lifestyle and abundant recreational advantages.

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EDP Professionals

Make A Move That Makes A Difference

The best reason to leave a **good** job is a **better** one! At Northern Telecom Inc., we have the organization, the challenge and the technological environment to provide a better career. Our telecommunications, business communications and electronic office systems organizations are located across the country, so we can also offer you the climate and lifestyle you prefer.

Northern Telecom wants your ideas, wants you to develop your full potential and wants you to achieve significant results as part of a professional team in our business systems area. We are developing and implementing distributed data processing systems for manufacturing, marketing, engineering, finance and personnel applications.

Our phenomenal growth presents you with challenges in the following business systems professional areas:

EDP Project Coordinator
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Programmer

These positions are available in:

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Your hardware tools will be IBM mainframes, Hewlett-Packard minicomputers and our own intelligent terminals. Software employed will include CMS, MVS, JES2, TOTAL, DATA MANAGER, RAMIS and COBOL... with heavy emphasis on nonprocedural languages.

If you have a Bachelor's degree in either a technical or business field, a demonstrated expertise in the latest software design methodologies, drive, initiative and excellent verbal and written communications skills, we are anxious to talk with you.

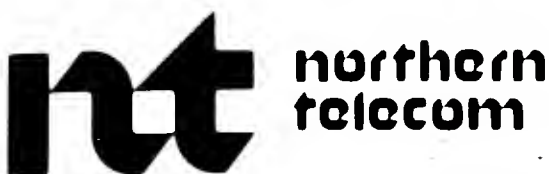
If you are ready to accept the challenge and make a **career** move, send your resume, including salary history or the attached mini-resume to:

Name: _____
Address: _____
City: _____ State: _____
Zip: _____ Telephone: _____
Present Position: _____
Present Employer: _____
Years Experience: _____ Education: _____
Position of Interest to me: _____
I am interested in the following location: _____



Send to:
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Human Resources Dept. C
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Develop on-line system design from functional definition and supervise implementation of system, providing detailed program specifications, standards review and assuring systems integrity. supervise programmer/analysts on a daily basis, coordinate with Rand management and technical support and the client company team.

PROGRAMMER/ANALYSTS:

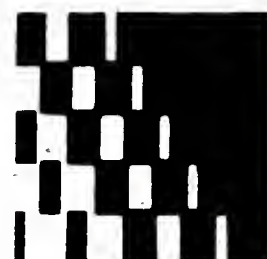
Specialist in analyses of customized on-line distribution system, trouble shooting, and consulting. Requires expertise in program or systems analysis, including client/user interface. Experience with on-line data base systems and manufacturing environments is highly desirable.

Benefits Include:

- **Six Month Reviews**
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Alice Micklewright



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(609) 667-4488

RSVP SERVICES, Dept. C
Suite 230, Dublin Hall
1777 Walton Road
Blue Bell, Penna 19422
(215) 629-0595

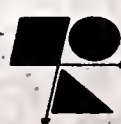
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BA in EDP/Computer Science and two (2) years experience in Financial Planning or Investment Analysis required. Knowledge of FORTRAN or APL needed. Exposure to Financial Planning and Modeling Languages and Financial Data Bases desirable.

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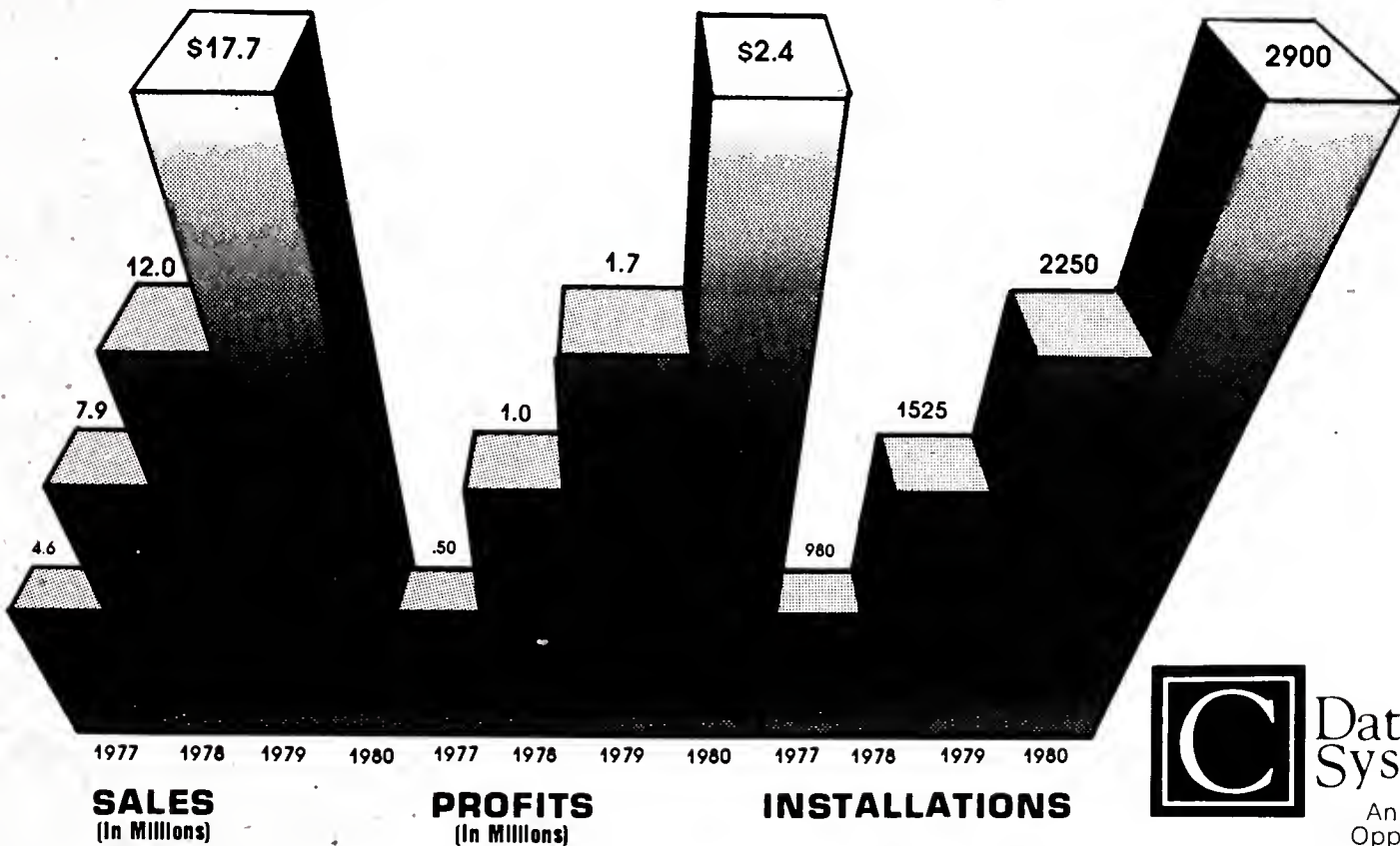
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Submit resumes to Susan Lasovick, Personnel Administrator
Cullinane Database Systems, Inc., 400 Blue Hill Drive, Westwood, MA 02090



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Best Products Co., Inc., the nation's leading catalog retailer, has an opening for a Software Support Analyst.

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- One or more years' as a Systems Programmer or Technical Support Analyst.
- One or more years of Assembler training.
- Honeywell/IBM experience helpful.

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Opportunities for career development, attractive salary and comprehensive benefits can be yours by becoming a vital part of our growing organization.

We are presently looking for programmers in our Information Systems area. These positions require a minimum of one year of experience in business applications programming or a bachelor's degree in computer science, a thorough knowledge of COBOL, and experience in large-scale computers. Familiarity with UNIVAC 1100 Series preferred.

At Sperry, we are involved in sophisticated



state-of-the-art application and challenging work. Take this opportunity to advance your career in a company with a solid future!

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Major Mid-Missouri Corporation is seeking results oriented MIS professionals to join our expanding MIS Systems Development Staff.

We desire 3-5 years experience in defining user requirements, designing and implementing complex information systems in an on-line environment. CICS and DL 1 experience are a plus.

Good communications skills are required. College degree in Computer Science, Accounting, or related area is desired. Experience in developing both batch and on-line systems will be beneficial.

If you desire to become an integral part of our people-oriented organization, send your resume in confidence to: c/o NAS, Dept. CW, One Mercantile Center, Suite 2803, St. Louis, MO 63101.

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For private vocational schools. Must be able to teach Basic, Cobol, Fortran and Assembly Languages. RPG II and PASCAL helpful but not required. Teaching or business experience. Full time and part time positions available in both Calif. and Penn. Contact: Bay-Valley Tech, 2550 Scott Blvd., Santa Clara, CA. 95050, (408) 727-2060, or Pennco Institutes, 3815 Otter St., Bristol, Penn. 19007, (215) 824-3200.

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SKK, Inc., a fast-growing Systems Software house located in the Chicago area, is seeking diversified System Programmers.

Responsibilities include maintenance and enhancement of our principle product, ACF2, and development of new Systems Software products on our in-house 4341.

The position requires sound knowledge and experience with MVS/JES. Experience with VS1, SE and SP is a plus. Exposure to other industry software products would be helpful.

SKK also has a position open for someone with experience in CICS generation, maintenance and macro level programming. experience with other DBMS systems desirable.

SKK offers competitive salaries plus excellent benefits including hospitalization, major medical, dental, prescription drug plan, life insurance, disability insurance, paid sick leave, tuition reimbursement and three weeks annual paid vacation.

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(San Francisco Bay Area)

We're Fireman's Fund Insurance Companies, a multi-billion dollar industry leader. Currently, we have a variety of application programming opportunities available, both on-line and batch, in our state-of-the-art systems organization located in San Rafael, California.

You should have 2-5 years' experience in COBOL. Experience with OS/JCL, IMS/DL-1, and TSO is desirable, but not necessary.

We offer excellent training and salaries, outstanding benefits and a comprehensive relocation program. For further information send your resume, including salary history to: Department 33, Nationwide Recruiter, Fireman's Fund Insurance Companies, 1600 Los Gatos Drive, San Rafael, CA 94119. We are an equal opportunity employer.



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\$18,000 - \$30,000**

MOORE DATA SYSTEMS, INC., a growth-oriented software systems company, specializing in on-line applications for local governments utilizing NCR equipment, is seeking creative programmers and analysts with COBOL background. Salaries are commensurate with experience. Good benefits package and bonus plan provided. Send resume immediately in complete confidence to:

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Our Travelers Cheque Division Is Doing A Little Traveling.



The Systems and Data Processing Department of our Travelers Cheque Division is headed west. Due west, to the great, open expanses of Salt Lake City!

Our growth rate has necessitated several major, new computer and communications systems enhancements which will make ours the most advanced communications/operations center in the industry. Changes of this magnitude necessitate building a totally new facility, and Salt Lake City, with its unique blend of cultural, recreational and educational facilities, has been chosen.

The priority of this new center will be meeting customers' needs more quickly, more effectively. Consequently, approximately 80% of the projects will be developmental in nature. The primary functions of the Systems and Data Processing Department will be systems development, IMS data base administration, advanced technology, systems assurance and planning, computer operations and technical support in a 303X, MVS/SP, IMS, DB/DC environment. To successfully carry out these responsibilities, we'll need developmentally-oriented data processing professionals who enjoy the challenge of implementing new technologies. Some positions will initially be based in New York City, with relocation to Salt Lake City mid-1982. Specifically, we're looking for:

- PROGRAMMING SYSTEMS CONSULTANTS
- PROJECT LEADERS
- SYSTEMS ASSURANCE PROFESSIONALS
- DATA BASE SPECIALISTS
- SYSTEMS ANALYSTS
- PROGRAMMER/ANALYSTS
- SOFTWARE PROGRAMMERS

If you have the spirit of adventure, if you're ready to work for a large international company, join the westward movement. We'll offer you an excellent salary and comprehensive benefits, plus the opportunity to really grow with our all-new operation.

To learn more about our plans for the future and how you fit into the picture, send your detailed resume, including salary history and requirements, in confidence to: American Express Company, Travelers Cheque Division, Personnel Dept CW54, 7th flr, 125 Broad St., N.Y., N.Y. 10004. We are an equal opportunity employer m/f.



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\$40-60,000+**

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The successful individual must have the following characteristics:

- Excellent presentation skills.
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If you feel you have the requisite personal and professional skills, please send your resume in complete confidence to:

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The County of Oakland is seeking a Manager of Computer Resources to plan and direct the day-to-day operations of the County's Computer Services Center. The Manager works closely with the Manager of User Services and reports to the Director of Computer Services.

The Center houses two IBM 4341 CPU utilizing DOS/VSE with VM, CICS, VSAM and an on-line network of over 280 terminals, much of which are on a 7 day, 24 hour basis. Current applications are primarily related to County governmental operations.

Candidates must have a Bachelor's degree and six years of experience in computer operations and technical support, including three years in a supervisory position. Additional experience may substitute for the degree on a year-for-year basis.

Salary of \$34,818 to \$40,931 is supplemented by a liberal fringe benefit package. The Computer Center offers a dynamic professional environment with opportunity to work with a state-of-the-art technology to provide cost effective computing utilities.

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Oakland County

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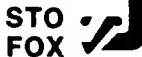
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SAN DIEGO: Electronic Systems Personnel Agency
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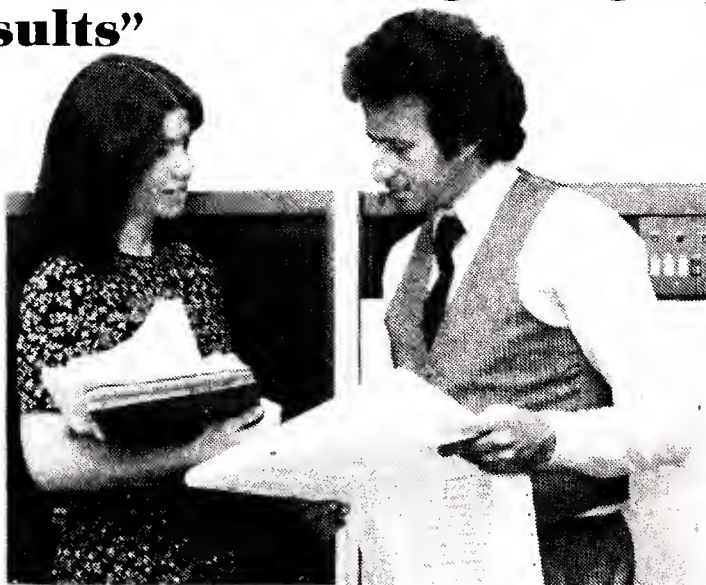
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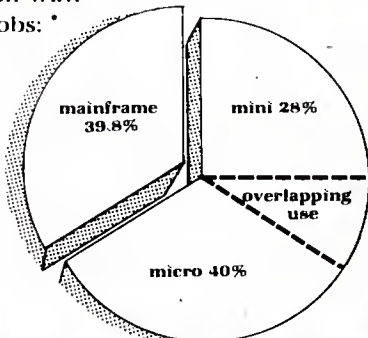
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- Provide developmental and operational support for the communications software in the host computers and out through the controllers.
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- Help customers to interface new devices to the CSO computers, or network.
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Sandy Moy, Asst. Director, Systems
Computing Services Office
University of Illinois
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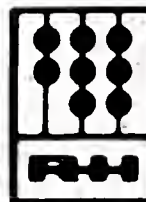
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LEAD PROGRAMMER ANALYSTS:

At least 4-6 years of demonstrated performance in systems development or high degree of technical proficiency on IBM S/34 or S/38 essential.

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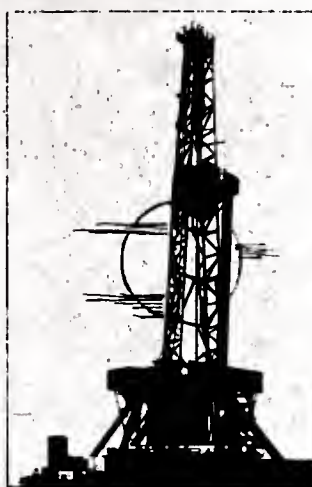
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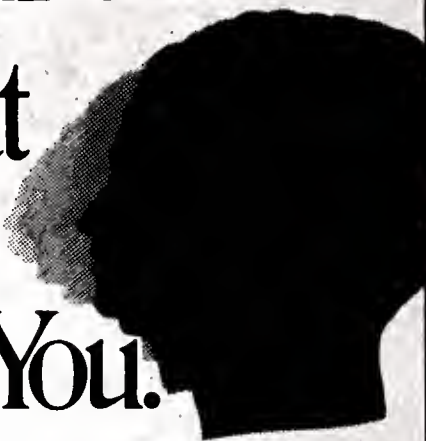
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A position is available as an Associate Engineer at a major elevator company's Research and Development Center. The duties include design, development and analysis of high speed, micro-processor-based elevator dynamic control systems utilizing advanced computer simulation and modeling techniques. Duties also involve domestic and international field implementation, checkout and test of newly developed control systems. A Bachelor's degree in systems engineering is required. Proficiency in programming the following languages: Fortran V, ACSL, and TI assembly as well as familiarity with the operating systems of the Univac 1110 and CDC Cybernet computers are required.

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\$1,920 - \$2,344/mo. In charge of Data Processing Division of City - seeking person with background in business type small computer systems, using RPG or Cobol language. Two yrs college with add'l study in D.P. Good fringe benefits. **Apply City Hall Personnel Office, 110 E. Cook St., Santa Maria, CA 93454., (805) 925-0951. Last date to apply: July 3, 1981**

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Churchlands College was established in 1972 and is situated 10 kilometers from the centre of Perth. In 1981 1,200 students (out of a total enrollment of 2,800) are enrolled in business studies courses.

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The College has a well-equipped computer centre with a recently installed PDP 11/44 and IBM 4331 dedicated to student use.

We require people who can teach or have recent experience in the areas of commercial programming, systems analysis and design, and data base. We are particularly interested in data processing professionals with experience in the IBM products CICS, DMS and DL/1.

Applications are invited from suitably experienced and qualified persons to fill these positions. Conditions of service are similar to those in other Australian Colleges of Advanced Education.

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The Personnel Officer
Churchlands College of Advanced Education
Pearson Street
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An immediate opening is available for a senior programmer with two years experience on an IBM System 3 Model 15D with RPG 2. Manufacturing background a must, with knowledge of APICS a plus. If you are interested in joining a dynamic growing company send resume and salary requirements to: Larry Gutbrod, Personnel Administrator, Koss Corp., 4129 North Portwashington Ave., Milwaukee, WI 53212.

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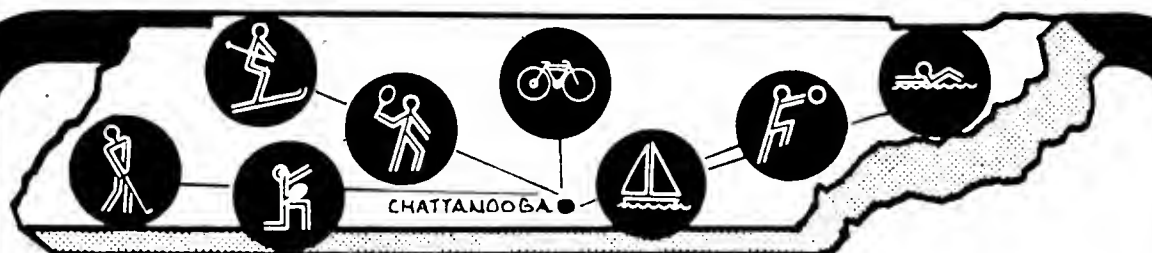
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Master's Degree in Computer Science. Must know Z-80 Assembly Language, Basic & Pascal. Must have experience through education or on-the-job in the development of interpreters for microprocessors. Involved in the development & design of interpreters & systems software for Z-80 and 8085 Microprocessor Computers. \$22,000 per year to work 40 hours/5 days/week. Please send resume to: **Monroe Systems for Business, The Great Road, Morris Plains, NJ 07950, (201) 540-7502.**

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RPG II PROGRAMMER NEEDED

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The campus Computer Center, located in the beautiful Rogue valley, is seeking a technical specialist with experience in the academic environment. Position is responsible for maintaining system software integrity, technical consulting, development of system level software and procedures, and coordination of hardware maintenance. Bachelor's degree, master's preferred; five years programming experience, including complex systems and assembler; software problem analysis; communications skills; electronics desirable; Harris computer experience desirable. Salary: \$17,000 to \$22,000. Mail application by July 15 to: **Dr. Tim Kelley, Computer Center, Southern Oregon State College, Ashland OR 97520.**

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SALARY \$18-22,000

EXPERIENCE REQUIREMENTS

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- Sentinel micro-computer experience beneficial

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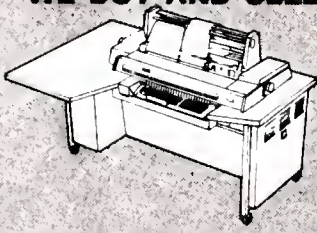
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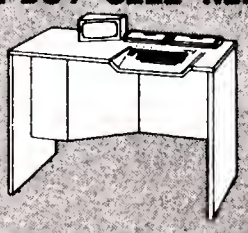
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RL01-AK	RL01 DISK	4,700.	3,850.
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RL02-AK	RL02 DISK 10MB	5,600.	4,600.
RM02 AA	67 MEG. DISK	19,300.	16,800.
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RM03 AA	67 MEG. DISK	20,300.	16,800.
RWM03 AA	67 MEG. DISK & RH70 CTL	29,300.	22,600.
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DH11 AE	16 CH ASYNC. MUX E1A, MC	7,550.	6,450.
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DD11-CK ... (new) ...	\$405	RK11D.... (new)	\$2,000
DD11-DK ... (new) ...	\$810	RKV11.... (new)	\$2,000
DH11-AA.....	\$5,040	RK06-EA	\$5,500
DMC11-AR .. (new) ..	\$1,700	RL01-AK	\$2,900
DMC11-DA .. (new) ..	\$1,200	RL02-AK	\$5,000
DZ11-A.... (new)	\$2,470	RM03-AA.....	\$15,000
FP11-A.... (new)	\$3,100	RP04-AA.....	\$10,000
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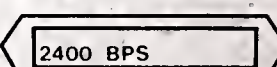
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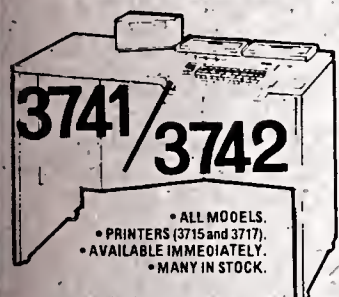
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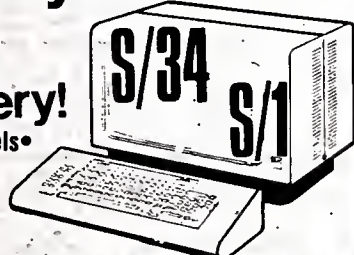
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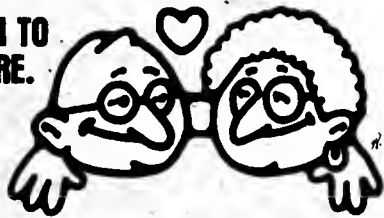
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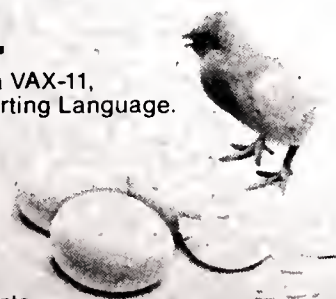
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Colgate-Palmolive and Lever Brothers are related by virtue of the products they make and the markets they sell. But Anaconda, Encyclopaedia Britannica, Manufacturers Hanover and Marriott are not. They're related in a different way. Through their attainment of leadership positions in their respective industries. It goes without saying that they also use financial software by McCormack & Dodge. So do over 1,000 other top companies in banking, consumer products, food and beverage, health care, insurance, manufacturing, natural resources, paper products, publishing, retailing, and transportation.

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